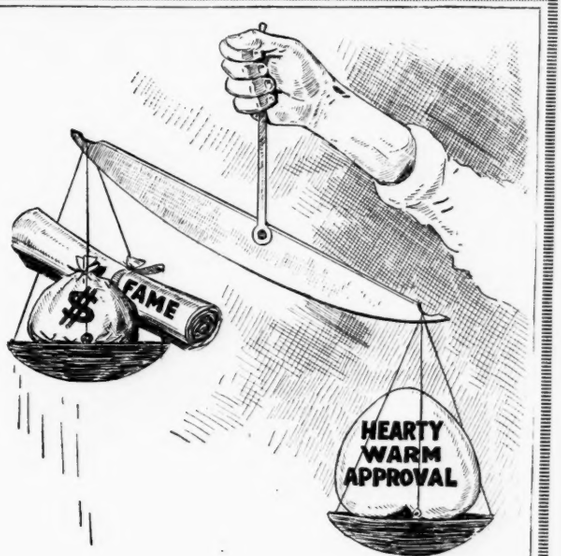
COAL AGE

Vol. 11 NEW YORK, MARCH 24, 1917 No. 12

Give Encouragement Now



MORE than fame and more than money is the comment kind and sunny,
And the hearty, warm approval of a friend;
For it gives to life a savor, and it makes you stronger, braver,
And it gives you heart and spirit to the end.
If he earns your praise, bestow it; if you like him, let him know it,
Let the word of true encouragement be said;
Do not wait till life is over and he's underneath the clover,
For he cannot read his tombstone when he's dead.

Verse from poem by
Berton Braley

Ideas and Suggestions

A Safety Suggestion

By J. A. Mitchell*

I would suggest that all electric mine locomotives be equipped with a rubber mat, in the bottom of the cab (or deck).

By this precaution the only ground a motorman need have would be through the hand. My experience has been that a shock from normal voltage (250 to 500 volts) does not prove fatal unless the victim has a good ground.

When the only ground is through the hand, the result of coming in contact with a live conductor is a severe shock of the arm. The large blood vessels are not much disturbed, nor is the nervous system badly shocked.

I have often used wood for an insulator in the bottom of cabs. The idea of rubber mats was suggested by R. E. Williams, a motorman in No. 1 mine of the Pond Creek Coal Co.

Finding Logarithms†

Have you ever been "out in the woods" away from a table of logarithms and "up against it" simply because you didn't have any logarithms to work with? If so, this rough method of finding approximate logarithms will doubtless interest you. It is simple and very easily remembered.

Lay off axes AC and BC at right angles to each other. From the intersection lay off nine equal spaces to the left, as shown, and mark them 1, 2, 3, . . . 10 from left to right. Then lay off ten equal spaces upward from the intersection, as shown, and mark them 0.1, 0.2, 0.3, etc. Then, with the extremes A and B as centers, and distance AB as a radius, locate the center D. From that center describe the arc AB.

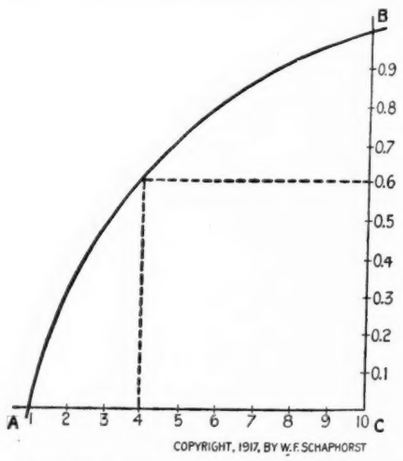


DIAGRAM FOR FINDING APPROXIMATE LOGARITHMS

We are now ready to read off our approximate logarithms. For example, what is the logarithm of 4? The dotted line shows how it is found. It is just a "hair" more than 0.6. Anybody familiar with logarithms will now understand the rest.

It is more convenient, of course, to make the drawing on coördinate paper, but if this is not handy one can easily do without it and employ plain paper.

Of course, this is not claimed to be better than a logarithm table, nor is it as good, but as an approximate method results will be found to be "pretty close" to those tabulated. Best of all is its simplicity and the ease with which this method can be remembered. Do it once and you will never forget it.

Freak Work in Promoting Coal Companies

By Mining Engineer

While there is probably less stupidity discoverable in connection with coal-mining promotions than with metal-mining projects, there still remains enough that is doubtful and suspicious to make us feel indignant at the ignorance exhibited by people who, in many cases, ought to know better. Concerns that are out and out frauds exist, but thanks to the regulations in force these are few and far between. The greatest percentage of loss through the failure of colliery companies really arises in those cases where there has at one time been some justification for a coal mine. Commonly the trouble is either that of "swelled head" on the part of the men at the helm of the concern or sheer inability to correlate properly the various factors that go to make up the business. These conditions, too, also, appear to be the more evident the farther away we get from the large and well-developed coal centers.

Consider the following two cases: Not far from Sydney, N. S., there is a colliery company that actually holds something like 50 sq.mi. of territory. For this it paid a fairly high price as these things go, and only discovered afterward that only one coal seam was available and that this occurred only on one-ninth of the area. Nevertheless, the incorporators regarded all acreage as coal land, and launched the company with a nominal capital of three million dollars. With this amount it laid out a town with streets and hotels that are the wonders of the neighborhood. These streets are graded and well built, electric lights adorn the corners and huge cuttings have been necessitated in many places to admit of these and other improvements.

After all this had been done, the slopes of the mine were started. Various difficulties being encountered, the mine was shut down. For some years it remained idle, and then it was again restarted. All the original capital

*Mine electrician, No. 1 Mine, Pond Creek Coal Co., Hardy, Ky.

having gone long ago, resource was had to the issuing of bonds of various classes, bank notes of various degrees and other financial arrangements, until the finances as presented to day are only to be likened to a Chinese puzzle. This time the company came to grief upon the question of getting its coal taken away to the market—the factor in coal mining that you imagine would have been settled at the beginning. While the company was considering what to do, the capital again gave out, and once more the mine was closed. Now comes the strange feature of the case. This company was organized and promoted by men who are in business already as successful mining men; but seemingly, because their operations were in a new country some distance away from their old works, they lost their heads and steered it toward disaster right from the beginning. How do you account for that? Greed, stupidity or carelessness?

The other case is perhaps more understandable in that it was ignorance that was at the bottom of it. A New Yorker went up to New Brunswick and fell in love with an 18-in. coal there. Forthwith he took up no less than a thousand square miles of coal lands, although there was no sign of coal except in the one spot. Think of it! A thousand square miles! Part of this may be rumor, but I have in my possession a plan that shows over four hundred square miles to the one name. Out of this huge area a couple of square miles was capitalized at two million dollars, which gave an absolutely prohibitive sum against the coal in the ground.

In the course of a number of years of travel and experience I have had the doubtful pleasure of seeing a number of such occurrences, and the more one thinks over their existence the more one wonders at the stupidity that seems to govern some men's ideas of mining. Evidently, there is something about coal mining that causes a certain class of men to completely lose their perspective, which results in the promotion of enterprises that outside mining men realize are preposterous. Unfortunately, the public which supports these projects has not the knowledge or ability to judge them properly, and this is the more regrettable because it brings discredit upon all mining men and particularly upon those who may be striving to do what is right.

The only remedy would seem to be an education of the coal-mining investing public to the underlying and relative conditions upon which success can be built. To do this is difficult, because the public does not read the technical papers, nor would they understand them if they did. The public reads the nontechnical press, and it would seem that the only way to distribute this knowledge would be through that medium.

Unwatering a Dip

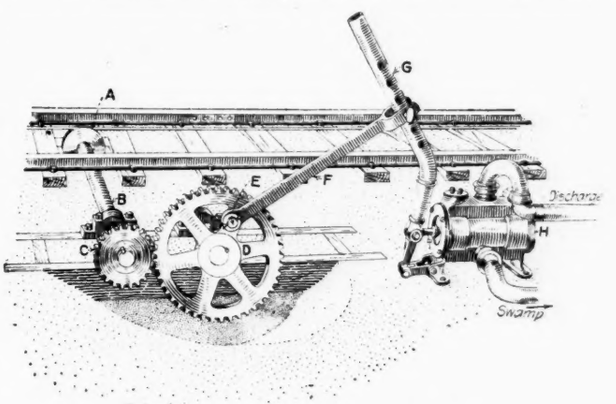
By Joseph Virgin*

Some time ago I had charge of a mine where a rope haulage 1¼ miles long was installed. Some distance from its outer end the main haulageway passed through a dip or swamp. For several years this depression had been a source of considerable annoyance, as the water sometimes rose to such a height as to enter the wheel bearings, as well as in other ways interfering with operation. It was the practice to bail the water out of this swamp into water cars twice a week.

To drain the swamp and at the same time obviate the expense of bailing I constructed the device here described—not without some opposition from other officials of the company.

A horizontal hand-operated force pump and 1200 ft. of pipe were purchased and installed. To drive the force pump the device shown in the accompanying illustration was built, practically all the material entering into its construction being reclaimed from a scrap pile that was located nearby.

Briefly, the construction of this "pump jack" is as follows: An ordinary rope pulley *A* was keyed to the shaft *B*. On the opposite end of this shaft the pinion *C* meshes with and drives the gear *D*. At the proper distance from the center, one of the spokes of this gear-wheel *D* carries the crankpin *E*, which transmits motion



THE PUMP JACK IN OPERATION

through the connecting-rod *F* to the pump hand lever *G*. The haulage rope thus operates the pump and drains the swamp.

In order to secure adequate friction of the rope upon the driving sheave *A* the trip rider, when the pump is to be started, stops at the pump and places the rope under the adjacent pulleys upon either side of the pump jack. When the swamp has been pumped dry, or nearly so, the trip rider again stops at the pump and puts the rope back in its normal position.

This device has worked successfully for several years. Once, however, when the mine was shut down on account of a strike, one of the mine bosses kept the swamp drained by operating the pump three or four hours per day by hand.

Roughening Gasket Surfaces

A pump had given considerable trouble by blowing out gaskets on the water end. It was desired to use graphite on one side of these gaskets, so that the heads and caps could be removed and replaced without spoiling the gaskets; therefore the water-end heads, cap and valve plates were roughened by bolting to the faceplate of a lathe and taking a light cut on the gasket face with a diamond-point tool, says Morris Ellison in *Power*.

No graphite is used on this rough surface, but the other side of the gasket is well covered so that the gaskets stick to the rough surface and the slight corrugations keep them from blowing out, while the other face parts from the smooth pump body and will go back perfectly tight and may be used a good many times before it needs renewing.

*Moundsville, W. Va.

Shotfiring in Bituminous Mines*

By M. D. Cooper†

SYNOPSIS—The miners of the Ellsworth collieries are allowed to take permissible powder into the mine, but only checks to be honored by the shotfirer are issued for blasting caps. The shotfirers load and fire the holes during the operation of the mine and act as assistants to the mine foremen. Paper gives in much detail the shotfiring methods adopted in the Ellsworth mines.

For the purpose of obtaining some first-hand data in regard to the shooting down of coal in bituminous mines, it was my good fortune to be employed as a shotfirer for almost one year. In all, I fired 6020 shots during this period.

All the work was done in what is known as the South Main section of the No. 2 mine of the Ellsworth Collieries Co., Ellsworth, Penn., a subsidiary of the Lackawanna Steel Co.

The established practice of the Ellsworth Collieries Co. calls first for the undercutting of the coal by electric chain machines across the face of the entry or room. This is followed by replacing any posts removed by the machine-runners, or the setting of new posts or timber, as may be required. After this has been done the machine cuttings are loaded into cars. Then the coal is cocker-spragged, and a shothole drilled to the depth of the undercut. Next in order, the shotfirer loads the hole and fires the charge. The working place is then cleaned up, timbered if necessary, the sides and face squared up, and loose material taken down. The face is then ready to be undercut again.

At the Ellsworth collieries, permissible explosives were used exclusively in blasting the coal. Those used were

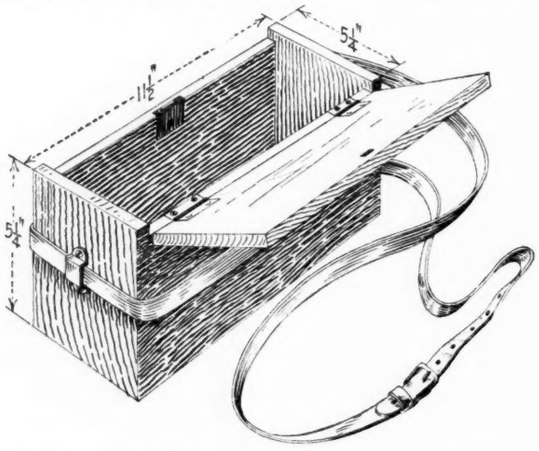


FIG. 1. BOX FOR SHOTFIRER'S BLASTING CAPS

Carbonite No. 2, a nitroglycerin explosive; and three different makes of ammonium-nitrate explosives, Tunnelite, Red H, and Mine-ite 5-D. The last-named was used during the greater part of the period covered by my experience. It is interesting to note that even at the beginning of this work, the gases resulting from exploding the charges caused no especial distress on the shotfirer's part and this continued to be the case except when a change was made from one class of explosives to another. At these times the gases had an unpleasant, but not at all serious, effect for perhaps a day. The explosive was brought into the mine by the miners, each man being required to have a small wooden box for this purpose. This box was provided with a grooved cover, and was of sufficient size to contain nine cartridges, each 1¼ in. in diameter and 8 in. long. Unless he had a box, the miner was refused a supply of explosives. To break up an occasional fall of rock in an entry, straight 40 per cent. nitroglycerin dynamite was used.

All the charges, both of permissible explosives and dynamite, were detonated by du Pont No. 6 electric blasting caps, equipped with 6-ft. iron wires. The uniformity of results obtained from these caps will be commented upon later in connection with the subject of misfires. Formerly, the miners were required to carry into the mine their own detonators, inclosed in small, locked boxes that held five or six caps.

Blasting Caps Not Delivered to Miners

This was an insufficient precaution, however, against danger from the acts of careless or inexperienced men. It was found that the new men sometimes stored explosives and detonators in the same box, and in some cases attempted to load their own shotholes before the arrival of the shotfirer. To eliminate all dangers that could result from these causes, it was decided to have all the detonators handled by the shotfirers only.

Consequently, provision was made for issuing checks to the miners in place of caps. When the miners called at the supply magazine to purchase their daily stock of caps, they were given checks, each good for one cap. One of the checks was in turn given to the shotfirer each time he fired a charge for the miner.

A convenient type of box for carrying electric blasting caps is shown in Fig. 1. This is the type used by the Ford Collieries Co., and is patterned after the Ellsworth box. It is constructed of ½-in. boards, is varnished inside and out, fitted with a hinged cover and lock and with small sheet-metal slots through which a shoulder strap is run. The dimensions are such that a du Pont paper box containing 50 exploders will fit snugly inside. Each shotfirer is supplied with two boxes, one being left with the supply clerk to be filled, while the other is carried into the mine for use. At the end of the shift, the shotfirer returns the box and also a miner's cap check for each detonator taken out of the box during the shift.

The lead wire used was No. 14 B. & S. gage duplex copper wire and about 110 ft. in length. This length was found ample for safety. However, from time to time a short length is apt to be broken from the end nearer the charge and to replace this loss a corresponding length must be spliced on. This may be neglected in some cases, as there is a tendency on the part of shotfirers to carry no more wire than is absolutely necessary. Here is a point of danger, often overlooked, that may well be given attention by safety inspectors.

*Paper read before the American Institute of Mining Engineers at the New York meeting, Feb. 21, 1917.

†Assistant superintendent, Ford Collieries Co., Curtisville, Penn.

The battery used consisted of two dry cells inclosed in a suitable container, so arranged that the contacts were made inside and the danger of accidental contact avoided. At the time I took up this work, the battery in use consisted of two standard dry cells fitted into a wooden box made of ½-in. boards. This proved unnecessarily heavy and inefficient. So, Andrew Boland, chief electrician of the Ellsworth Collieries Co., was requested to have a new battery made, to hold two small cells of the type usually employed in flash lamps. He devised the battery, illustrated in Fig. 2, which was found to be especially convenient, for it could be carried in the pocket. Moreover, it was doubly safe because before the circuit was completed it was necessary both to insert the key and press down the two contact buttons.

Clay was used for tamping all shotholes. The usual procedure required that the shotfirer observe the quantity on hand in his section of the mine. When this fell below a sufficient amount the mine foreman was notified, and he sent a load in a mine car by the night shift to the point designated by the shotfirer. The clay was usually unloaded in some crosscut already closed to ventilation by a stopping and located conveniently to a number of working places. Here the miner obtained his individual supply. If the clay proved too dry, enough water was added to make it so plastic that it could be worked by hand into roughly cylindrical masses about 1 in. in diameter and 6 or 7 in. in length.

To blast falls of rock the explosive was usually placed on the upper surface of the piece to be broken, and then a shovelful of rather wet clay was packed over the charge before firing. The miners were all required to provide a tamping rod. This was in all cases obtained by them from among the young trees in nearby woods. It was 6 ft. long and 1 in. in diameter.

In addition to the materials described above and used in the firing of shots, it was necessary, of course, to provide each shotfirer with an approved flame safety lamp, in order to enable him to comply with the law and the rules of the mine, requiring him to test for gas.

Method of Firing

The first step to be taken in an effort to safeguard the firing of shots is the selection of suitable shotfirers. The Bituminous Mine Law of Pennsylvania provides that in the portions of a mine where locked safety lamps are used, "the mine foreman shall employ a sufficient number of competent persons, who are able to speak the English language, to act as shotfirers, whose duty shall be to charge, tamp and fire all holes properly placed by the miners, and to refuse to charge any holes not properly placed."

To meet these requirements fully, it is essential that those selected for this work be men who appreciate the responsibility placed upon them, who understand the proper use of explosives, and who are willing and able at all times to keep constantly in mind the fact that the reason for the creation of their positions is the prevention of accidents. It has been found desirable to have men with fireboss' certificates employed as shotfirers, if it is possible to obtain them. There are two good reasons for this arrangement. First, a man with the certificate is generally competent to undertake the work. Second, if the regular fireboss is unable for any reason to make his run, a man is available who is thoroughly familiar with the regular fireboss' territory, and is able to go in and make the examinations as required by law.

The number of shots that may be fired in one shift depends upon the extent of the section covered, the proportion of narrow places to wide places, and the experience and ability of the shotfirer. Under average conditions, a shotfirer ought to be able to load and fire between 40 and 50 shots during an 8-hour shift. This limit may be exceeded where the working places are concentrated; or, on the other hand, it may not be reached

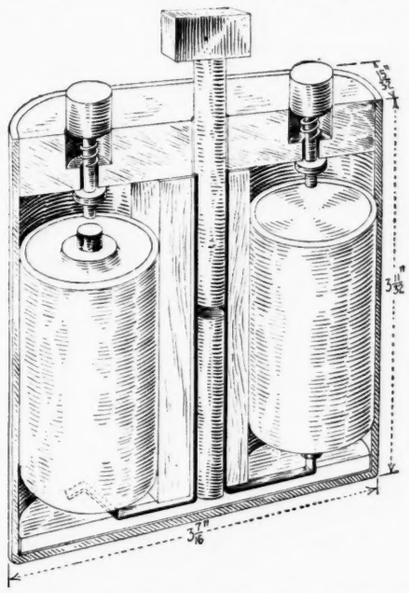


FIG. 2. BLASTING BATTERY FOR SHOTFIRING

by a shotfirer who is required to visit a widely scattered group of narrow working places. Fig. 4 is a portion of the map of Ellsworth No. 2 mine showing the South Main section. The route of the shotfirer is shown by the dotted line.

Cycle of Operations

In making his rounds, the first act on the part of the shotfirer is to find whether the loader at whose place he has arrived is ready to have his coal shot down. It is possible to determine this by standing in the entry and calling or whistling to the man at the face, or by going into the working place and making a personal examination. By far the best method is the latter, as it affords more frequent inspection of the working places during the shift; but when a shotfirer must cover a difficult section, it may be impossible for him to go into every place on each round.

Having found that a shot is to be fired, the shotfirer is required to make a thorough examination of the condition of the place. First, the safety lamp is used to make sure that there is no trace of gas present. The roof and sides are examined to see that the required method of posting or timbering has been followed and that no additional timbering is required. Furthermore the shotfirer carefully notes whether two 7-ft. posts have been placed as cockersprags at the face, if it is a room, or one, if it is an entry that has to be shot. These posts, or cockersprags, are shown in Fig. 3. The miner must load out all his slack. The position of the place with respect to other workings ahead or at the sides must be noted, and the men in these places notified that a shot is to be fired. When breaking up a rock fall in an

entry, the same precautions must be taken and men must be posted at safe distances on both sides of the fall to warn persons that the shotfirer is about to shoot.

The condition of the place having been found satisfactory, the shotfirer next examines the hole that has been drilled into the coal by the miner. First, he inspects it to be sure that the location of the hole conforms to the rules of the mine, these locations being shown approximately in Fig. 3. Second, by using the tamping rod he measures the length of the hole to see that it does not exceed the depth of the undercutting. Third, he examines the hole to see that the drill cuttings have been removed.

The shothole is then charged. The miner produces his box of explosive and the shotfirer selects from it the required amount of material, usually 2½ sticks in the case of a "tight" shot, and from ¾ to 1½ sticks for a "butt" shot. The explosive is examined to see that it is in good condition and that it is marked "Permissible." Keeping one full stick out, the others are carefully inserted one at a time and pushed to the back of the hole by means of the tamping rod. A hole is then made in one end of the cartridge that has been retained. The hole is made parallel to the axis of the cartridge by using a wooden pin or a small piece of No. 0 copper wire pointed at one end. An electric detonator is then obtained, the 6-ft. iron wires straightened out and the cap inserted in the cartridge, the wires being wrapped once around the cartridge to prevent the cap from being pulled

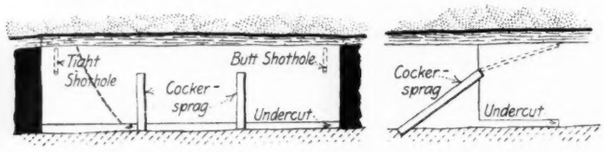


FIG. 3. DRILL HOLES AND COCKERSPRAGS IN FACE

out. The cartridge being thus prepared is inserted in the hole, the end containing the cap going in last. The shotfirer allows the iron lead wires to slowly slip through his left hand while the cartridge is driven carefully in by the tamping rod held in the right hand.

Clay used in tamping the hole having been prepared beforehand by the miner, it is now ready for use. Kneeling before the shothole, the miner inserts one piece at a time, while the shotfirer, still holding the ends of the lead wires, drives the clay home with the tamping rod, taking care to merely press the first two or three pieces against the explosive, while the rest are solidly packed in until the hole is completely filled.

After a shothole has been properly loaded and tamped, the shotfirer attaches his cable to the ends of the detonator lead wires. This is done by tightly winding the latter five or ten times around the ends of the cable. Following this, the shotfirer walks slowly away from the charge, uncoiling his cable with all due care to avoid breaking the connection between lead wires and cable. Also, to prolong the life of the cable, it is advisable to string it over cars, timber, a pick driven into the rib, or any other means of support that can be utilized to keep it elevated from the bottom and prevent its being buried under the coal about to be shot down. Of course this precautionary measure is found much more useful in the firing of the butt shot, but it is considered worth while even in the case of tight shots.

All the preliminary steps having been taken, the shotfirer then must select a safe place in which to stand while firing the charge. The place must be out of range of flying pieces of coal and also free from unsafe roof, or else properly timbered. Moreover, there is also the final precaution of seeing that all other persons have been warned and are out of danger and that no person, unaware of the shotfirer's presence, is walking into the danger zone.

Being satisfied that all is in readiness and that the men in adjacent places have been warned, the shotfirer calls out his warning loudly: "Fire!" Then he inserts the key in the battery, presses the ends of his cable against the contact buttons of the battery, pushes down on the buttons, completes the circuit, and fires the charge.

Following the firing of a shot, it is always advisable to wait a minute or two that the ventilating current may clear away the smoke, and that an opportunity may be afforded the shotfirer to listen carefully for any sound of roof movement.

Then the shotfirer proceeds carefully toward the point at which the shot has been fired, at the same time coiling his cable over the palm of his hand and the back of the upper arm. A careful examination of the roof follows. Then, by means of the safety lamp, any evidence of the liberation of gas is looked for. The face and sides of the place are examined for dangerous slabs that may drop off and injure the miner. Finally, the timbering and sprags are noted to see whether they have been disturbed by the blast. At the completion of his reëxamination, the shotfirer carefully explains to the miner each possible source of danger he has noted and instructs him how to remedy any dangerous condition existing. In the event of the discovery of any serious danger, the shotfirer fences the place off, fixes danger signals on the fences, and sends the miner affected to report to the mine foreman.

Misfires

Upon completing the circuit when firing with electric detonating caps, the charge may fail to explode for one or more of the following reasons: (1) Defective or exhausted battery; (2) broken wire or connection or short-circuit due to imperfect insulation; (3) defective detonating cap; (4) deteriorated explosive; (5) detonating cap detached from cartridge.

A battery of the type shown in Fig. 2 has been found to give satisfactory results for an average of 600 shots before it becomes necessary to renew the cells. Therefore, if the shotfirer keeps a record of his shots and the time at which a battery was placed in service, he can readily predict the date at which to expect the failure of his battery. On the other hand, some misfires are caused by imperfect contacts within the battery, due to the presence of a small amount of coal dust at contact points. These difficulties can, of course, be avoided by frequent inspection and sandpapering of contacts.

Misfires due to a broken or disconnected or short-circuited cable are the most frequent of all misfires, and are therefore generally the first suspected following the failure of a charge to explode. Proper care of the cable when about to shoot and again after shooting is quite necessary to reduce this source of misfires to a minimum. Fortunately, in most cases of this kind, the cause is easily discovered and quickly remedied.

In the firing of the 6020 shots on which this paper is based, only three misfires resulted from defective electric blasting caps, indicating quite positively the dependability of this method of blasting. In order to avoid any danger from the subsequent handling of these caps, they were destroyed by placing them on the haulage road and running a locomotive over them. When subjected to this treatment, two of the caps failed to explode, while the third was exploded. The conclusions reached were that the first two had not been filled with fulminate, while the other was evidently filled but either the bridge wire or the iron lead wires were broken.

Misfires from Deterioration of Cartridge

Sometimes a cartridge of explosive that had deteriorated found its way into a shothole. Ordinarily the shotfirer may readily detect such cartridges by their unusual hardness or softness. If, however, such a cartridge is used, while the report of the blasting cap may generally be heard quite distinctly, the charge of explosive fails to detonate. In two or three instances, misfires were the result of blasting caps becoming detached from the cartridge. This was due to the cap working loose during the charging of the shothole. In the case of misfires due to either of the first two causes, the remedy lay in the repair or replacement of cable or battery or in reëstablishing a broken contact. On the other hand, the last three causes of misfires always involved the drilling of a new shothole. It was the general practice to circumscribe the hole with a rough circle at least 12 in. in radius and to instruct the miner to drill a new hole outside the circle, and parallel to the original hole. In any case, the miner was forbidden to drill out the contents of the misfired hole, and reminded of the dangers of that procedure. When it became necessary to fire a second charge following a misfire, it rarely, if ever, happened that the first charge was exploded. Therefore, the miner was required always to search the coal shot down to locate the cartridges of the charge that failed. These were generally ready for inspection by the shotfirer on his next visit to the working place.

In the firing of the shots discussed in this paper there were no so-called windy shots and only one blownout shot. The latter was in an entry and was a small charge intended to break down the coal remaining after the coal broken by the tight shot had been loaded out. The blownout shot was apparently caused both by a charge that was too light and a hole that was slightly in the solid.

Shotfirer's Report

A form of report for shotfirers is illustrated herewith. It has been found that a report of this kind is useful in checking up the work of the shotfirers and in determining the cause of any difficulties in shooting. Also, it serves as a daily reminder of the necessity for exercising care.

SHOTFIRER'S REPORT OF FORD COLLIERIES CO.

..... Mine
Section No. ..... Date .....

1. Did you examine each place for gas and other dangers before firing? .....
2. Did you give warning to persons in adjacent places? .....
3. How many shots did you fire today? .....
4. Give location of any place in which you refused to shoot and reason .....
5. Misfires.

	Location	Cause
1		
2		
3		

6. Blownout Shots.

	Location	Cause
1		
2		
3		

7. Did you examine each place for all dangers after shooting? .....

Mine Foreman. Shotfirer.

The most essential precaution to be taken in an effort to safeguard the firing of shots is in the selection of properly qualified men to do the work. Moreover, it is especially desirable that one or two competent men be made available to act in the capacity of shotfirer in case of the absence of the regular incumbent of that position. It is a dangerous practice to place the battery and wire in the hands of a partly qualified man and tell him to shoot during the shift. Nor is it sufficient, as a rule, to assume that because a man was once considered competent to act as shotfirer, he will always continue to be careful in the performance of his duties. It is advisable to issue special instructions from time to time for the purpose of keeping shotfirers alert and to inform them what practices should be avoided as being dangerous.

The shotfirer should never lose sight of the importance of giving adequate warning before shooting. The best practice is to personally warn all men on all sides within dangerous proximity to the charge, then to call out loudly to warn persons approaching from other parts of the mine, and finally to wait 5 or 10 sec. after calling before pressing the buttons and firing the charge.

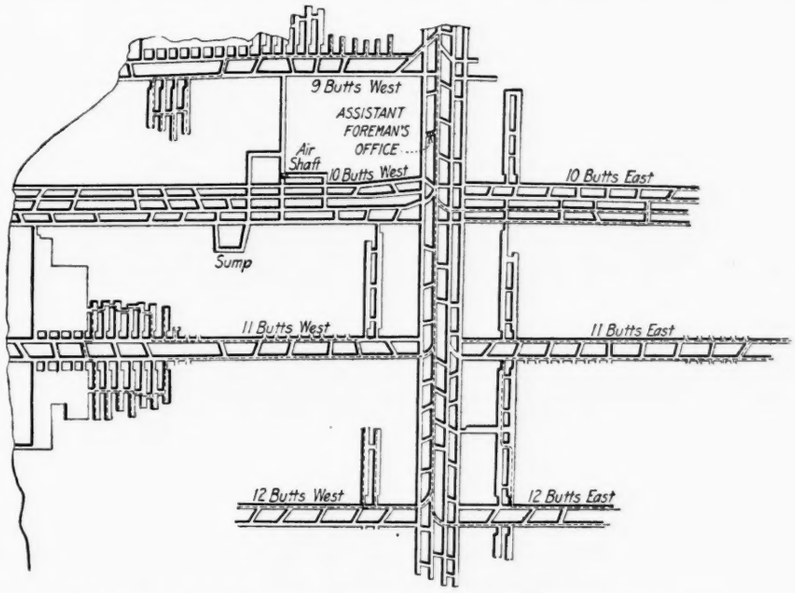


FIG. 4. A SHOTFIRER'S DISTRICT IN ELLSWORTH NO. 2 MINE

So much has been written concerning the advantages of permissible explosives, that it is unnecessary to enumerate them here. For gaseous mines, they constitute a very important element of safety. To insure their most efficient and safe use, they should be carefully looked after in the magazine outside, examined before being issued to the miners, and transported into the mine in proper containers. Finally, they should be charged and fired by competent persons.

Discussion of Foregoing Paper

In the discussion that followed, Arthur LaMotte, of Wilmington, Del., made in effect the remarks hereunder appended:

Mr. Cooper makes the following statement: "For the breaking up of an occasional rock fall in an entry, straight 40 per cent. nitroglycerin dynamite was used." I believe that this practice is one involving much danger and would suggest that the use of nitroglycerin dynamite should not be allowed in gaseous and dusty mines, inasmuch as manufacturers of explosives make strong, quick-acting "permissible" explosives which are well suited for this purpose.

Mr. Cooper describes a battery used for firing the electric blasting caps, which consisted of two dry cells inclosed in a container, so that accidental contact was avoided. The E. I. Du Pont de Nemours & Co. has made a number of experiments with dry-cell batteries for blasting and has abandoned them all after exhaustive tests, as it is not possible, unless the blaster is equipped with rather expensive and delicate instruments, to determine whether the dry cell will develop enough current to fire the electric blasting caps. There have been so many instances of misfires due to their use that a blasting machine of much greater capacity and much smaller size has been developed, especially for use in coal mining. This is known as the Du Pont pocket blasting machine (Fig. 1). It will easily fire three or four electric blasting caps at one time, and is only about as large as the battery described in Mr. Cooper's paper.

FIG. 1. BATTERY NOT DEPENDENT ON DRY CELL

Mr. Cooper mentions the method used in making a primer, and also calls attention to the probability of misfires being due to the detonating cap becoming detached from the cartridge. This method of making a primer is described as inserting the cap in the cartridge and wrapping the wires once around the cartridge to prevent the cap from being pulled out. His description is not clear, but it corresponds to the practice known as half-hitching, the wires being brought at right angles to each other and a tension applied to the ends forming a hitch and sharp bend in the wires and a possible short-circuit of electric current at that point.

Almost all manufacturers of high explosives recommend that wires of electric blasting caps should not be

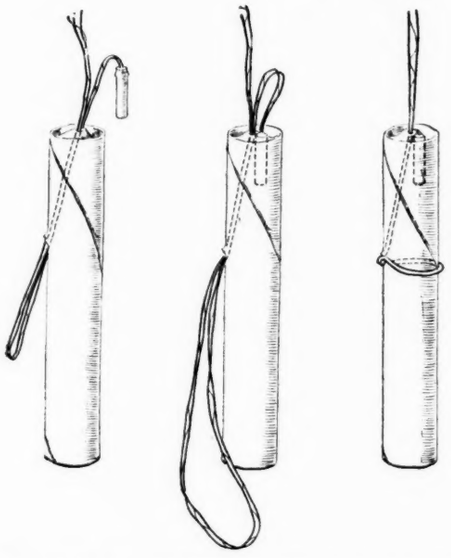


FIG. 2. HOW TO INSERT PRIMER IN CARTRIDGE

half-hitched around the cartridge because of the possibility of short-circuiting or breaking the wires, with the attending danger of misfires. A much better way of making a primer is shown in Fig. 2, which needs no description.

In Mr. Cooper's summary of the causes for misfires, the first one, defective or exhausted battery, would be obviated by the use of the small-size blasting machine previously described. The second cause, broken wire or connections on short-circuit due to imperfect insulation, would be largely done away with by correct priming methods.

The third cause, defective detonating caps, is one which very rarely occurs in our method of manufacture, as each electric blasting cap is tested twice before leaving the factory. The fourth, deteriorated explosive, can be guarded against only by using common-sense measures in storing and handling the explosive after it has been received.

The fifth, detonating cap detached from cartridge, can be entirely eliminated by using a proper method of priming the dynamite cartridge with the electric blasting cap.

The method that Mr. Cooper mentions for destroying defective electric blasting caps—that of placing them on the haulage road and running a locomotive over them—is a rather dangerous one, as the electric blasting caps are likely to fly for a considerable distance on exploding and may embed particles of copper in the flesh of persons standing even 30 or 40 ft. away. A better way to destroy these is to bury them in close contact with a good electric blasting cap, several inches under ground, and fire the good cap. This will detonate the others.

Safety Work in Ontario Mines

By James Bartlett*

SYNOPSIS—Brief description of the Ontario mines and their production. Classification of fatal mine accidents during four years, 1912-1915 inclusive. Standardization and testing of explosives by the Government. Inquests; ventilation of mines; storage and handling of explosives; safety methods and appliances; prevention of dust, etc. Workmen's Compensation Act.

The mineral production of Ontario in 1915 was valued at $61,800,000, or 44.6 per cent. of the total for the Dominion of Canada. The principal products were: Nickel, 31,000 tons; copper, 20,000 tons; silver, 23,700,000 oz.; gold, 411,000 oz. In addition iron pyrites, iron ore, feldspar, talc, graphite and mica were mined in the province. The dividends from Ontario metal mines last year amounted to $20,000,000. The mineral possibilities are now being recognized and the mining industry is expanding very rapidly.

The most important areas are: The Sudbury nickel area, the Cobalt silver area and the Porcupine gold area. Sudbury is the world's principal source of nickel and over 70,000,000 tons of nickel ore have been proved with a considerable portion of the ranges still unprospected. The chief inspector of mines recently estimated that the prospected part of the field contains, in addition to the nickel, at least two billion pounds of copper and $60,000,000 worth of gold, silver, platinum and palladium.

Fatal Mine Accidents

Sufficient evidence has been gathered in recent years by statisticians to prove that the accident rate in metal mines is higher than in coal mines. Formerly it was generally believed that the reverse was the case. The fatal accident rate in Ontario for the last 15 years averages 3.18 per thousand men employed. Last year it was 1.51 and was the lowest of which there is any record in Ontario mines. A perusal of the statistics of the province for the last four years shows that the fatal accidents may be classified as follows: Those due to explosives, 28 per cent.; shaft accidents, 24 per cent.; miscellaneous causes, 21 per cent., which covers such accidents as falling down winzes or stopes; struck or buried by ore; crushed between cars; struck by falling objects, etc.; surface accidents, 19 per cent.; and falls of ground, 8 per cent.

The percentage of accidents due to explosives is very high as compared with other countries where reliable statistics are available. It is difficult to guard against accidents from this cause and to explain why they should form so large a percentage. The cold weather in the winter months is no doubt responsible for many accidents.

The standardization and testing of explosives by the Dominion Government would probably help matters. A testing station for this purpose has been advocated for some years, but has not yet materialized. In the last two years the use of No. 8 detonators has become quite general underground, and as a result there are fewer unexploded sticks of dynamite left in the bottoms of holes than formerly. Gelatin dynamite has become the most popular explosive, and the number of cases of asphyxiation is considerably less than with the old-time straight nitroglycerin dynamite.

Inspection of Ontario mines began in 1890 and most of the clauses of the Mining Act of Ontario have been passed since that date. The inspection staff at present consists of a chief inspector and three deputy inspectors. I will mention a few points in the Act, hoping it may arouse some discussion.

Inquests—An inquest is compulsory in case of a fatality in or about a mine, and an inspector invariably attends. This frequently interferes with the inspector's routine work, but is nevertheless an important clause in the Act. Everyone dislikes inquests, with the possible exception of the coroners, who receive good fees by way of consolation. Mine officials in particular dislike attending these functions. If an inspector were not present to examine the witnesses it is quite likely that the facts would not be brought out, as the coroner is generally unfamiliar with mining practice and it frequently happens that there is no one on the jury who has any knowledge of mining. Also, the inspector gains a great deal of information which is useful in devising means to prevent the repetition of similar accidents, and he often learns, while examining men under oath, of unsafe practices that would not otherwise be brought to his notice.

Ventilation—While this is the most important subject in connection with the working of collieries, it unfortunately receives too little attention in the average metal mine. If ventilation were more closely studied by metal-mine operators the results obtained, owing to the improved health and efficiency of the workmen, would well repay them for the effort.

Storage, Thawing and Use of Explosives—The maintenance of a storage magazine within 400 ft. of the mine, works, or any public highway is forbidden. In the draft of laws recommended by the commission who were appointed to investigate the subject of mining regulations for the U. S. Bureau of Mines, 300 ft. is the specified limit. In the case of some of the larger mines these distances are undoubtedly insufficient. One Ontario mine is at present using 2½ tons of gelatin dynamite per day. This problem of storing large quantities of explosives is one with which we are frequently confronted, but it is doubtful if the question can be satisfactorily dealt with by legislation. Climatic and topographic conditions, the quantity of explosive used and the discipline on each particular property are important factors. If thawing houses be placed too far away from the shaft, dynamite may in the coldest weather enter the mine in a frozen condition. In some cases underground thawing rooms are used and occasionally the question arises in the case of large mines whether such rooms, containing large quantities of explosive, should be permitted underground or not. In a warmer climate the explosive risk is not so great.

A reliable recording thermometer must be placed in the room in which the thawing is done and a temperature record kept. The use of such a thermometer enables the superintendent to keep a close check on the temperature

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of the thawing house and in a number of cases overheating to the danger point was discovered, whereas nothing of the kind was suspected previously.

Another clause of the Act forbids drilling in a working place where there are missed holes.

Protection of Working Places—In shaft sinking a pentice of rock, timber, iron or steel must be provided if any material is being hoisted in the same shaft from any of the upper levels. Such covering has to be sufficiently strong to withstand the shock of the loaded bucket, skip or cage falling from the highest point in the shaft. This regulation has saved many lives.

Timbering—In Ontario there is no swelling ground. The rock is for the most part hard and stands well. Methods are used which require a minimum amount of timber in the stopes. Overhead shrinkage stoping is general in the large ore bodies.

Ladderways—In shafts or winzes the ladderway must be separated by a closely boarded partition from the hoisting compartment. Ladderways are required to have platforms at intervals of not more than 20 ft. and ladders must not be set in a vertical position.

Shaft Appliances—All cages in which men are handled must be constructed with a hood of steel plate not less than $\frac{3}{16}$ in. thick, with sides covered with $\frac{1}{8}$-in. sheet iron or steel or wire netting, and with gates 5 ft. high. This regulation was put into force Jan. 1, 1915, and is working well. We are glad to be rid of the old skeleton cage, which was still in use at a few mines. At first some trouble was experienced in getting a suitable gate that could be easily opened and closed but could not be sprung outward by pressure from within. This difficulty, however, was soon overcome.

Escapements—When a shaft has been sunk more than 100 ft. and 200 ft. or more of drifting done and stoping started, in addition to the hoisting shaft, a separate escapement shaft or opening must be provided.

Protection from Machinery—Under this heading are the usual rules relating to guard rails, projecting setscrews, inspection of boilers, etc. It is regrettable that the manufacturer cannot be compelled by law to attach such necessary safeguards as gear casings, etc., to machinery before shipment is made from the factory. Quite often it is necessary to compel the purchaser to have this done with new machinery and often he is in an out-of-the-way place, where the facilities for doing such work are not the best.

Prevention of Dust—As the work of commissions in different parts of the world has proved that working in a dusty atmosphere affects the lung tissues, the subject is of especial interest to mine inspectors. Medical men have in some cases taken exception to the terms "miners' consumption" and "miners' phthisis" and designate the disease or condition caused by the dust by the name "fibrosis." But by whatever name it be known, cases of the disease are to be found in nearly every metalliferous camp, especially since machine mining has been in vogue. The subject has been dealt with by able investigators in the Transvaal, in West Australia, in the Rand and recently in Missouri. All agree in attributing the disease to dust, poor ventilation and the consequent breathing of dynamite fumes and vitiated air, all of which exert a harmful influence. While individual opinion on a question of this nature may be of doubtful value, it has often occurred to the writer that the scarcity of men of over 45 yr. of age in metal mines is largely due to such cause. This does not seem to be so noticeable in colliery towns as coal dust is not so injurious in that respect.

Since the Porcupine gold district was discovered in 1909, gold mining has become one of our important industries. Three of the mines already have each got over $16,000,000 worth of ore reserves developed above the 700-ft. levels. Besides these there are many other smaller but important producers. The ores are largely siliceous and the question of dust prevention is, therefore, important. One of the chief causes of dust is the drilling of dry holes with the hammer drill. Spraying attachments, working on the injector principle, were tried, but it was found that most of the miners would not use them. In several of the large mines the method of stoping has been modified so that chiefly wet holes are drilled. The increased use of the Leyner-type of drill is helping to solve the problem in certain kinds of ground and is doing good work, particularly in drifting. The Hollinger gold mine is at present experimenting with hammer stoping drills with telescopic feed, hollow steel and water attachment and report favorable results to date.

Workmen's Compensation—At the close of 1915 a Workmen's Compensation Act had been in force in Ontario for one year. By its terms compensation is payable irrespective of any question of negligence or absence of negligence, and the old defences of common employment and voluntary assumption of risk are no longer applicable. The only cases in which no compensation is paid are: 1. Where disability lasts less than seven days. 2. Where accident is solely due to serious and wilful misconduct on the part of the workman and does not result in death or serious disablement.

For an accident resulting in death the payment is $20 per month and $5 for each child under 16 yr. of age up to a total of $40. In no case is the compensation to exceed 55 per cent. of the workman's earnings. In case of total disability the workman receives 55 per cent. of his earnings in the employment. Where the workman is only partially disabled he is entitled to 55 per cent. of the impairment of his earning capacity.

Prior to the operation of the Compensation Act most of the larger companies insured themselves in a casualty company against damages for accident. If the accident rate became abnormally high at any mine the insurance company increased the rate of insurance, sometimes doubling the rate on very short notice. This generally resulted in a storm about the works of the offending company and a genuine effort was made to reduce the accident rate. This incentive is not now in existence to the same extent as the assessments from all mining companies are paid into a common fund. Several of the companies which had safety organizations before the Compensation Act came into force have since allowed them to expire. The Compensation Act, therefore, while an excellent piece of advanced legislation, has not assisted mine inspectors in improving mining conditions.

The foregoing article, by Mine Inspector James Bartlett, is reproduced from the Proceedings of the ninth annual meeting of the Mine Inspectors' Institute of the United States of America as showing the interest taken in the mine-safety movement in Canada. The decennial meeting of the Institute will be held July 10-13, at Indianapolis, Ind., when a large attendance is desired.

Hand Stoking Soft-Coal Boilers

Owing to the greater quantity of soft coal than anthracite, most mine steam power plants are operated on soft coal. The proper design of the boiler setting to permit of the most perfect combustion is essential to economic operation, and the proper stoking of these furnaces is of utmost importance both from the standpoint of smoke reduction and fuel economy. Smoke is a most direct measure of imperfect combustion and consequently of low economy. Charles H. Bromley in *Power*, Jan. 9, 1917, gives data on proper design and operation that should prove interesting and profitable to the mine operator using hand-fired soft coal furnaces as his source of power. It is the duty of firemen to burn coal economically and with as little smoke as possible. In this article bituminous coal is considered exclusively, and the best methods of burning it in hand-fired horizontal tubular boilers as demonstrated under commercial conditions. However competent the man, smokeless and economical combustion is commercially impossible unless the furnace is suitable; that is, has volume, proper proportions and adjuncts. Without these essentials—namely, draft, temperature, time, and gas and air mixing provisions—good combustion cannot be had. A typical soft coal has the following principal constituents as received: Fixed carbon, 57.6%; volatile, 32.24%; ash, 7.32%; moisture, 2.84%. The coal is a solid. On being burned everything but the ash and what combustible remains in it is driven off as gas accompanied by a small quantity of fine solid particles. The volatile matter consists largely of oils which will distill off, some at temperatures a little below 300 deg. F., and others, the heavier ones, at 800 to 950 deg. F. Running normally, the furnace temperature will be about 1,800 to 2,500 deg. F. (hand-firing)—from six to eight times as high as needed to support distillation. After these oils vaporize and gasify, they must receive enough air for their combustion, must have sufficient temperature to carry on combustion and must be well mixed with the air for combustion. And all this should happen before the gases get into the boiler tubes; in fact, for best results the whole combination of events should be completed before the gases touch the heating

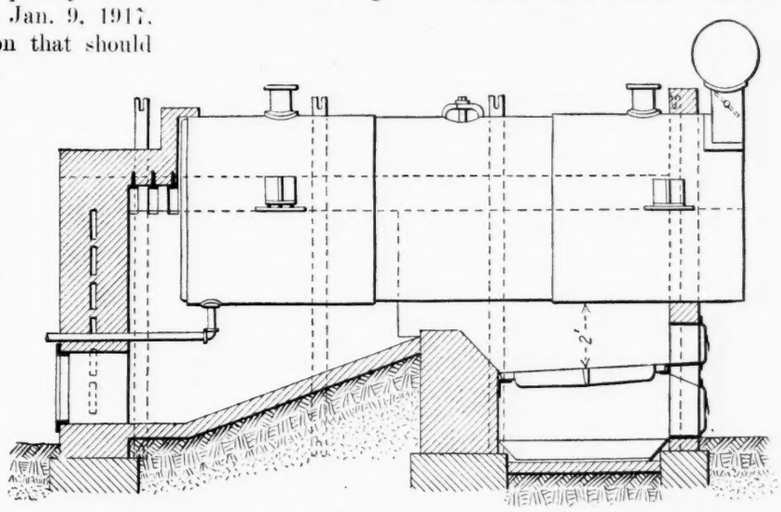


FIG. 1. THE OLD HARTFORD STANDARD SETTING

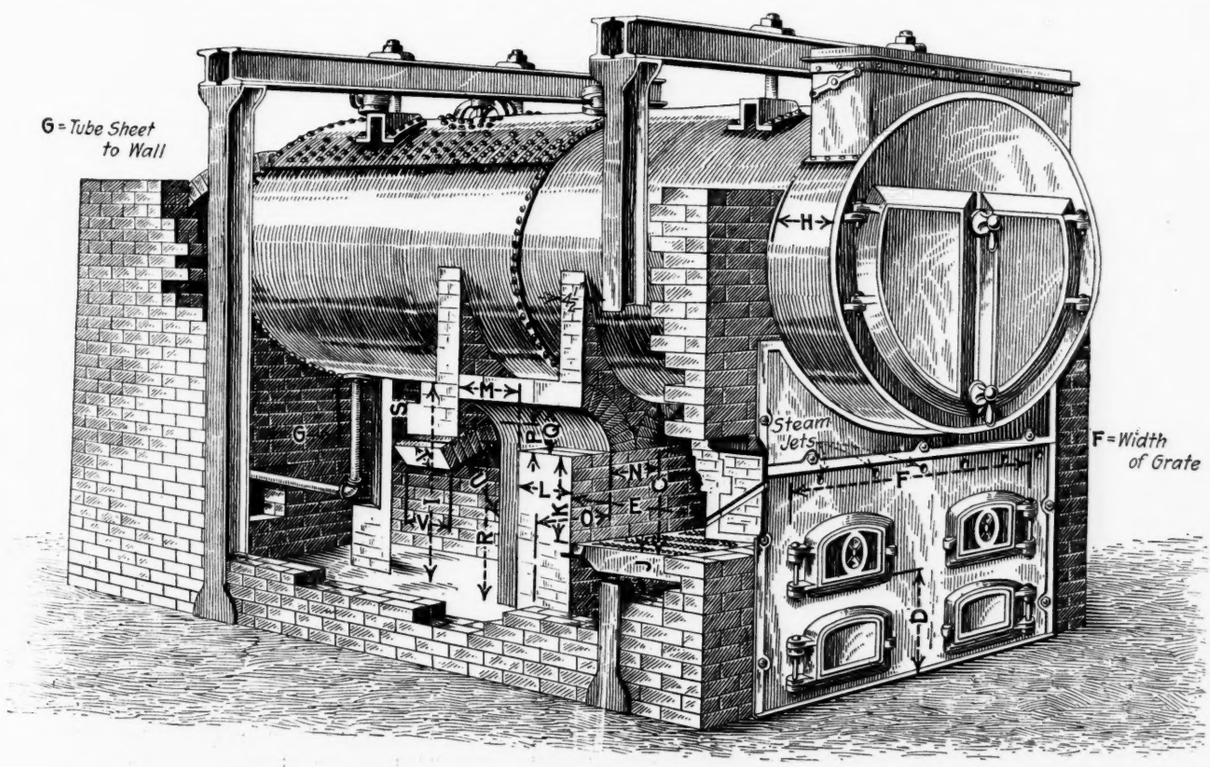


FIG. 2. IMPROVED TYPE OF SETTING RECOMMENDED FOR HORIZONTAL RETURN-TUBULAR BOILERS

surface at all—in less than a second, even with an uncommonly high setting. Is it to be wondered at, then, that this is impossible in the widely used Hartford standard setting, Fig. 1, where the boiler shell is but two feet above the grate?

In one investigation of a large number of boiler plants it was found that over 90% of the boilers were of

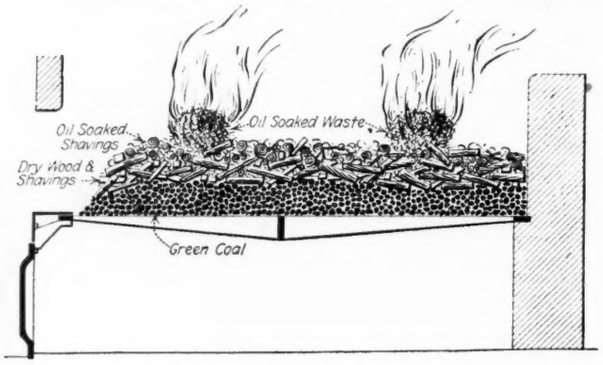


FIG. 3. STARTING THE FIRE

the horizontal return-tubular type having settings wherein the distance from grate to shell was not more than two feet.

The flush-front and the extension-front dutch oven and several other types of settings have been investigated, and

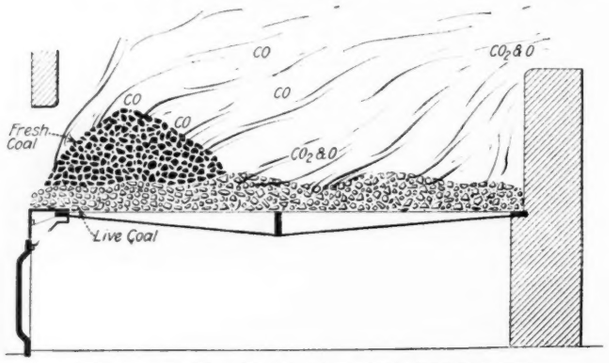


FIG. 4. COAL COKING AT THE DEADPLATE

that which gave the best results, smokelessness and economy considered, is shown in Fig. 2. This setting is recommended by nearly all smoke inspectors and is becoming standard in soft-coal burning districts. It represents the application of facts discovered and corroborated by thousands of tests and observations. The dimensions as given in the accompanying table referring to Fig. 2 are those used by the smoke inspection department of a large municipality. It is recommended that for all hand-fired furnaces using coal above 25% volatile the distance from shell to grate be not less than 4 ft. or the nearest approach to that height that commercial brick will give.

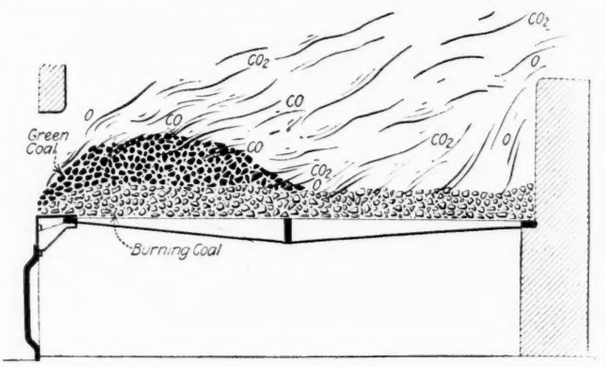


FIG. 5. COKING METHOD WITH FRESH COAL SPREAD OUT MORE THAN IN FIG. 4

To build a fire in a cold boiler without excessive smoke, is regarded as at least extremely doubtful by the average man. But it can be done. Here is a method applicable to stationary boilers, which gives good results.

The entire grate is covered with 3 in. of gas coal (assumably a coal containing from 32 to 38% volatile) spread evenly, and upon this is laid a layer of low-volatile coal (about 20%) thoroughly wet to a depth of 4 in. Dry wood shavings are then spread over the surface of the coal, after which an ordinary bucket of shavings soaked in crude oil is distributed on top of the dry shavings. A piece of oil-soaked waste is thrown into the middle of the grate to ignite the shav-

SPECIFICATIONS FOR IMPROVED SETTING HORIZONTAL TUBULAR BOILERS TO ACCOMPANY FIG. 2

Diameter shell	84 in.	84 in.	78 in.	78 in.	72 in.	72 in.	66 in.	66 in.	60 in.	60 in.	54 in.	54 in
Length shell	20 ft.	18 ft.	20 ft.	18 ft.	18 ft.	16 ft.	18 ft.	16 ft.	18 ft.	16 ft.	16 ft.	14 ft.
C	42 in.	42 in.	42 in.	42 in.	36 in.	36 in.	36 in.	36 in.	36 in.	36 in.	36 in.	36 in.
D	2 ft. 2 in.	2 ft. 2 in.	2 ft. 2 in.	2 ft. 2 in.	2 ft.	2 ft.	2 ft.	2 ft.	1 ft. 10 in.	1 ft. 10 in.	1 ft. 10 in.	1 ft. 10 in.
E	6 ft. 6 in.	6 ft.	6 ft. 6 in.	6 ft.	6 ft.	5 ft. 6 in.	5 ft. 6 in.	5 ft.	5 ft. 6 in.	5 ft.	4 ft. 6 in.	4 ft.
F	7 ft.	7 ft.	6 ft. 6 in.	6 ft. 6 in.	6 ft.	6 ft.	5 ft. 6 in.	5 ft. 6 in.	5 ft.	5 ft.	4 ft. 6 in.	4 ft. 6 in
G	2 ft. 10 in.	2 ft. 10 in.	2 ft. 8 in.	2 ft. 8 in.	2 ft. 6 in.	2 ft. 6 in.	2 ft. 4 in.	2 ft. 4 in.	2 ft. 2 in.	2 ft. 2 in.	2 ft.	2 ft.
H	1 ft. 10 in.	1 ft. 10 in.	1 ft. 9 in.	1 ft. 9 in.	1 ft. 8 in.	1 ft. 8 in.	1 ft. 7 in.	1 ft. 7 in.	1 ft. 6 in.	1 ft. 6 in.	1 ft. 5 in.	1 ft. 5 in.
I	6 ft. 4 in.	5 ft. 10½ in.	6 ft. 5½ in.	6 ft.	5 ft. 11½ in	5 ft. 6½ in.	5 ft. 7 in.	5 ft. 1½ in.	5 ft. 9 in.	5 ft. 4 in.	4 ft. 11 in.	4 ft 8 in
J	6½ in.	6 in.	6½ in.	6 in.	6 in.	5½ in.	5½ in.	5 in.	5½ in.	5 in.	4½ in.	4 in.
K	1 ft. 10½ in.	2 ft.	1 ft. 9½ in.	1 ft. 11 in.	1 ft. 6 in.	1 ft. 7 in.	1 ft. 7 in.	1 ft. 8 in.	1 ft. 5½ in.	1 ft. 6½ in.	1 ft. 7½ in.	1 ft. 6 in.
L	2 ft. 3 in.	2 ft. 3 in.	2 ft. 3 in.	2 ft. 3 in.	2 ft.	2 ft.	1 ft. 10½ in.	1 ft. 10½ in.	1 ft. 10½ in.	1 ft. 10½ in.	1 ft. 6 in.	1 ft. 6 in
M	3 ft.	3 ft.	2 ft. 10 in.	2 ft. 10 in.	2 ft. 6 in.	2 ft. 6 in.	2 ft. 4 in.	2 ft. 4 in.	2 ft. 2 in.	2 ft. 2 in.	2 ft.	2 ft.
N	1 ft. 6 in.	1 ft. 6 in.	1 ft. 6 in.	1 ft. 6 in.	1 ft. 1½ in.	1 ft. 1½ in.	1 ft. 1½ in.	1 ft. 1½ in.	1 ft. 1½ in.	1 ft. 1½ in.	1 ft. 1½ in.	1 ft. 1½ in
O	2 ft. 9 in.	2 ft. 9 in.	2 ft. 6 in.	2 ft. 6 in.	2 ft. 5½ in.	2 ft. 5½ in.	2 ft. 2½ in.	2 ft. 2½ in.	1 ft. 11½ in.	1 ft. 11½ in.	1 ft. 8½ in.	1 ft. 8½ in.
P	1 ft. 4 in.	1 ft. 2 in.	1 ft. 5½ in.	1 ft. 3½ in.	1 ft. 1 in.	1 ft. 1½ in.	1 ft. 1½ in.	1 in.	1 ft. 3 in.	1 ft. 1½ in.	1 ft. 1½ in.	1 ft. 2½ in
Q	2 ft. 5½ in.	2 ft. 3½ in.	2 ft. 5½ in.	2 ft. 3½ in.	2 ft. 2 in.	2 ft. ½ in.	2 ft. ½ in.	1 ft. 11 in.	2 ft. ½ in.	1 ft. 11 in.	1 ft. 8½ in.	1 ft. 9 in
R	4 ft. 2 in.	3 ft. 10½ in.	4 ft. 2½ in.	3 ft. 11 in.	3 ft. 11½ in.	3 ft. 8 in.	3 ft. 8½ in.	3 ft. 4½ in.	3 ft. 9 in.	3 ft. 5½ in.	3 ft. 2 in.	2 ft. 10 in
S	2 ft. 2 in.	2 ft.	2 ft. 3 in.	2 ft. 1 in.	2 ft.	1 ft. 10½ in.	1 ft. 10½ in.	1 ft. 9 in.	2 ft.	1 ft. 10½ in.	1 ft. 9 in.	1 ft. 10 in
T	9 in.	9 in.	9 in.	9 in.	9 in.	9 in.	9 in.	9 in.	9 in.	9 in.	9 in.	9 in.
U	1 ft.	1 ft.	1 ft.	1 ft.	1 ft.	1 ft.	11 in.	11 in.	10 in.	10 in.	9 in.	9 in.
V	1 ft. 1½ in.	1 ft. 1½ in.	1 ft. 1½ in.	1 ft. 1½ in.	1 ft. 1½ in.	1 ft. 1½ in.	1 ft. 1½ in.	1 ft. 1½ in.	1 ft. 1½ in.	1 ft. 1½ in.	1 ft. 1¼ in.	1 ft. 1½ in
Number and size of tubes	92–4 in.	92–4 in.	88–4 in.	88–4 in.	70–4 in.	70–4 in.	54–4 in.	54–4 in.	46–4 in.	46–4 in.	36–4 in.	36–4 in
Heating surface in tubes	1932.0	1738.8	1842.8	1658.5	1323.0	1176.0	1017.7	904.6	866.9	770.6	604.8	529.2
Heating surface in shell	219.9	197.9	204.2	183.8	169.6	150.7	155.5	138.2	141.3	125.6	113.1	99.0
Total heating surface tubes and shell, sq.ft	2151.9	1936.7	2047.0	1842.8	1492.6	1326.7	1173.2	1042.9	1008.2	896.2	717.9	628.2
Boiler horsepower	215	194	205	184	149	133	117	104	101	90	72	63
Square feet of grate surface	45.5	42.0	42.25	39.0	36.0	33.0	30.25	27.5	27.5	25.0	20.25	18.0
Area through each bridge wall retort, sq.in	820.0	756.0	761.0	702.0	648.0	594.0	544.5	495.0	495.0	450.0	364.5	324.0
Area between bridge wall and deflection arch, sq.in.	2448.0	2448.0	2040.0	2040.0	1770.0	1770.0	1484.0	1484.0	1326.0	1326.0	984.0	984.0
Area under deflection arch	3280.0	3024.0	3041.0	2808.0	2592.0	2376.0	2177.0	1979.0	1979.0	1800.0	1457.0	1296.0
Area of tubes, sq.in	1011.0	1011.0	967.0	967.0	769.0	769.0	593.0	593.0	505.0	505.0	396.0	396.0
25% over flue area	1264.0	1264.0	1208.0	1208.0	961.0	961.0	741.0	741.0	631.0	631.0	495.0	495.0

Notes—First grade of firebrick to be used throughout with the exception of the combustion chamber floor and the side walls of the chamber back from a point one foot behind the rear face of the deflection arch. Fire-doors MUST provide for special air admission of an area equal to 4 sq.in. for each square foot of grate surface, when working pressure on boiler is 20 pounds or less. If desired, these doors may be used on boilers carrying more than 20 pounds pressure. Make the effective area through damper frame not less than the combined area of tubes. See ordinance for breeching and other regulations. Table applies only for the ordinary conditions and is subject to revision or modification for unusual conditions. Heating surfaces are in square feet, areas in square inches, except for grate surface.

ings (see Fig. 3). The blower is opened very lightly and the opening increased as the coal becomes ignited. The fire-door is kept open until after the coal is burning, or longer, depending upon the condition of the stack. Sometimes more coal is needed before a good fire is had,

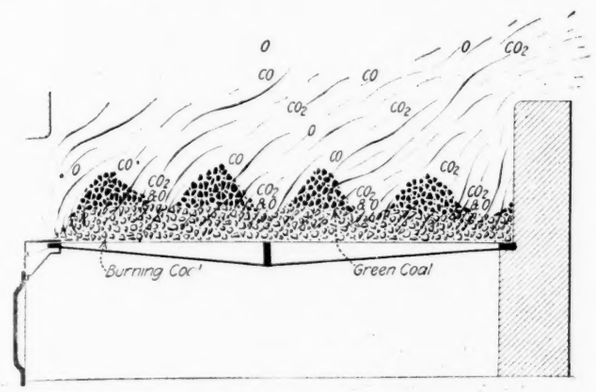


FIG. 6. COAL COKING IN SMALL PILES

and if so, wet low-volatile coal is used. The gas coal is used to prevent the low-volatile coal from falling through the grate.

This method of building a fire is correct from every viewpoint. The fire burns from the top down, causing the volatile to pass through a zone hot enough to completely gasify the vapors. The fire should not be sliced or hooked or otherwise disturbed. The method is applicable to a stationary boiler, and although the low-volatile coal may not be easily had, coal from the everyday

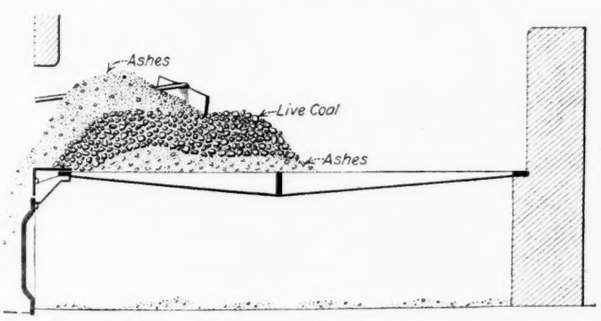


FIG. 7. BACK HALF OF GRATE CLEANED FIRST

supply will do. Fig. 3 shows the method applied to a stationary boiler.

Maintaining the fire between cleaning periods requires no mean skill. The coking method with which every fireman who reads should be familiar is not always the best. A glance at Fig. 4 shows that only a small part of the total surface of the green coals coking is exposed to the direct heat of the furnace. If the pile of coal coking could be left there long enough, the volatile would be driven off so slowly as to make no objectionable smoke. But it must soon be pushed and spread over the hot fire, and when this is done the volatile in the coal beneath the surface of the pile has reached a temperature where only a slight increase is needed to make it give forth its vapors so suddenly as not to give time for adequate mixing with air, thus making dense black smoke. The lowered furnace temperature also helps to make smoke at this time. All this is clear when we realize that the rapidity of distillation depends, for any given temperature, upon the surface of coal exposed to the heat. Less smoke will be made, even with a "puffy" coal if the pile is spread as in Fig. 5, and if steam-air jets or other means of getting air in over the fire are used.

The alternate method of firing has the same disadvantage, in that the green coal, even though thrown on but one-half or one-third of the fuel bed, has so much of its surface exposed at once to the incandescent coal that distillation is more rapid than can be cared for by the air admission. Unfortunately, too, these vapors should receive heat as they go on their way to the uptake instead of losing it. With this method the gases do not pass directly over an incandescent area, as they do when the coking method is employed. It has been suggested to throw the green coal in small piles well distributed over the burning fuel, and later, when most of the volatile has been distilled to level these piles (see Fig. 6). The idea is to gradually expose the whole charge of coal to the direct heat of the furnace. Theoretically the method is good,

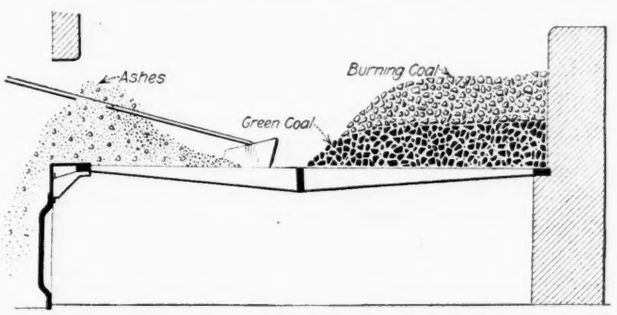


FIG. 8. CLEANING THE FRONT HALF OF THE GRATE

but it is hard work for the fireman and unfortunately gets him into the habit of disturbing the fuel bed with rake or slice bar, a most egregious fault.

Whether the coking, alternate, or the divided method of covering is used, or if the whole fire surface is covered at once, the covering must be thin and done frequently. This is particularly true of caking coals. Caking coals form the surface crust so peculiar to them during the coking process. The crust prevents sufficient air reaching the coal, and high spots form in the fuel bed. If

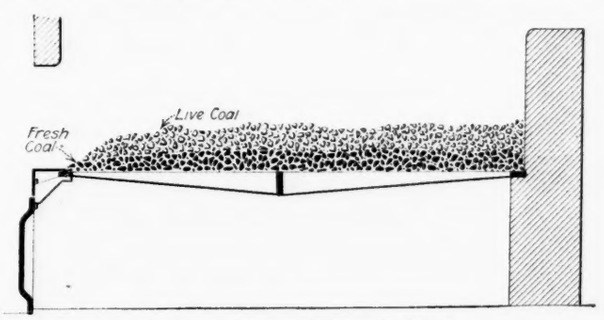


FIG. 9. THE FIRE CLEANED

these places are covered with fresh coal before the surface of the high spots has been broken and allowed to burn away, the trouble grows worse. Do not cover unburned places in the fuel bed. The troubles had with many caking coals may be made nearly negligible if the fire is always covered lightly and often. Use the rake and slice bar as little as possible, but remember that the crust of caking coal must be often broken, if formed, to maintain the desired steam pressure. When breaking the crust, be careful not to so disturb the fuel bed as to

get ashes on or near the top of the fire. Usually this causes serious clinker trouble, which stops the normal flow of air through the fuel bed and gives rise to more caking.

For a not too-heavy covering and at normal hand-firing combustion rates, it takes from 2 to 6 min. for the volatile to be driven off. During the major part of this time use the steam jet if provided or open the fire-door to admit air in above the fire. The time it should be left open depends, of course, upon the rapidity of distillation of the quantity of the vapor and gas distilled.

There is probably no more practicable satisfactory way of cleaning a fire than that shown in Figs. 7, 8 and 9. The back half of the grate is first cleaned as shown in Fig. 7, then about 3 in. of green coal is thrown on the bare grate and all the live coal pushed back on top of the green coal, which begins to burn from the top down, making it necessary for the vapors and gases to pass through the hot coal (see Fig. 8). The ashes are pulled from the front of the grate, green coal thrown on and the live coals at the back pulled forward and evenly distributed over the whole fuel-bed surface, Fig. 9.

Responsibility for Injury to Contractor's Employee—A coal mining company is not liable for injury to an employee of a contractor employed by the company to drive heading in a mine, if the accident was due to negligence of the contractor over whom the coal company had no control in the matter of the details of performance of the contract. (Alabama Supreme Court, Roger vs. Roden Coal Co., 73 Southern Reporter, 33.)

Coal Holdings of Western Roads

There is considerable activity among Western railroads to acquire undeveloped coal lands to conserve their future fuel supply. It is known that negotiations have been afoot recently between representatives of certain carriers and owners of coal properties in Indiana, Illinois, Missouri and Iowa, with that end in view. Some of the Western roads which are not well protected by reserve coal holdings are becoming active in this direction, owing to the higher prices asked by coal operators under future contracts. Undoubtedly the situation will cause the values of undeveloped coal lands of proved worth to rise considerably. It is known that developed coal properties with top plants recently offered for sale have been quoted at figures 100 per cent. over what they were considered worth a year ago.

Below is a statement showing the present holdings of coal lands by Western railroads:

Road	Acres
Atchison, Topeka & Santa Fe Ry	12,000
Chicago, Burlington & Quincy Ry	30,800
Chicago & Eastern Illinois Ry	49,700
Chicago & Illinois Midland Ry	60,000
Chicago & Northwestern Ry	45,000
Chicago, Milwaukee & St. Paul Ry	33,800
Chicago, Rock Island & Pacific Ry	40,000
Illinois Central Ry	24,100
Illinois Traction System	4,000
Litchfield & Madison Ry	12,000
Missouri Pacific Ry	7,000
New York Central System	97,300
St. Louis, Troy & Eastern Ry	30,000
Toledo, St. Louis & Western Ry	15,000
Union Pacific Ry	25,000
Vandalia Ry	9,700
Wabash Ry	80,000
United States Steel Corporation	60,000

Needless Advice

It was in a Mining Paper

IT was in a mining paper
Which from week to week I scan,
That a list of "Don'ts" was printed
To instruct the mining man;
And among the many warnings
Set before him there, I read
That if accidents should happen
He should never lose his head.

Well, it struck me rather funny,
Yet it seemed too bad to joke
In a sober-minded journal
Written for the mining folk;
For a fellow who is working
Where the snares of peril spread,
Doesn't need to be reminded
To be careful of his head.

HE could lose his reputation,
Or his temper, or his nose,
And dispense with teeth or fingers,
Or a couple of his toes;
But in case of grim disaster,
He's aware that he'd be dead
If he failed to heed instructions
And should chance to lose his head.

So, advise him to be cautious,
Tell him not to lose his wits
When a sudden danger threatens
To distribute him in bits;
But as long as breath and spirit,
Thought and reason haven't fled,
You can bet your bottom dollar
He'll be sticking to his head.

He'll be sticking to his head

By RUFUS T. STROHM
Written expressly for Coal Age

The Coal Situation in France

SYNOPSIS—Abstract from the report made by the American Industrial Commission to the American Manufacturers' Export Association, covering that part of the report which concerns the fuel industry. The account presents an interesting review of the current situation and outlook, though the lack of a trained coal man on the commission is so apparent that it leaves much to be desired.

The normal French coal production is about 40,000,000 tons per year. This may be compared with the output of other countries in 1912 (coal, anthracite and lignite), which was as follows: Belgium, 22,972,000 tons; Austria, 42,000,000 tons; Germany, 255,800,000 tons; England, 260,416,338 tons; United States, 495,922,000 tons.

Since the outbreak of the war, the production in France has declined as follows: 1913, 40,000,000 tons; 1914, 30,000,000 tons; 1915, 20,000,000 tons. This decline is due to the occupation of the northern coal-mine regions by the Germans.

Before the war, the French coal consumption averaged 60,000,000 tons per year. The normal shortage of 20,000,000 was made up through importation. England supplied about 13,000,000 tons; Germany 3,500,000 tons; Belgium 3,500,000 tons; and other countries 300,000 tons.

Since the outbreak of the war, the fall in production has been accompanied by a fall in consumption to 40,000,000 tons, leaving the coal shortage as before, or 20,000,000 tons. In 1914 there were imported into France 15,430,000 tons, of which 10,759,000 tons came from England; and in 1915, 19,067,000 tons, almost all from England.

Under normal conditions, the average price of French coal at the mines has fluctuated between 10.8 fr. and 15.8 fr., as follows: 1893, 11.49 fr.; 1906, 10.84 fr.; 1908, 15.84 fr.; 1910, 14.50 fr.; 1912, 15.51 fr.

The price of English coal always has been somewhat higher than that of French coal, owing to its superior quality. The rise in the price since the war has been very great.

At present there are two classes of prices—the coal from French mines is sold at from 25 to 45 fr., according to quality and conditions; the coal from foreign sources is sold at 150 fr. and above. The low prices for domestic coals are paid by French concerns which have long-term contracts. Certain concerns in Limoges, for instance, state that the prices at which they obtained their limited supply had not been materially increased.

Before the war, the prices obtained for domestic coal practically governed the price paid for imported coals. But the important reduction in output, resulting from the invasion of northern France, brought about new and anomalous conditions that soon caused an important difference between the prices of domestic and imported coals.

In the case of domestic coals, the tendency to rise in price with increasing scarcity was checked in two ways: First, by action of the mine operators, who voluntarily restricted themselves to an increase of about 25 per cent.; second, by the Government, which did all in its power to keep down the prices and to equalize them throughout the whole country, by its monitory influence and also by encouraging increased activity and output of existing mines and the reopening of abandoned mines.

There were several important causes for the advance in the price of imported coals independently of the price of domestic coal: First, the shutting off of the Belgian and German supply from the seas decreased the available sources and left England practically alone as a source of supply for the increased demands of France, Spain, Italy and Greece; second, the war itself increased greatly the coal requirements of the allied nations; third, the increase in demand for English coal coincident with increased labor difficulties and greatly augmented cost of mine working; fourth, and most important, the cost of transportation by water, resulting from the great losses in ship tonnage caused by the war, reached figures which were greater than the cost of the coal itself.

Under these extraordinary circumstances English coals could no longer be imported at a price competing with or governed by the price at which domestic coals could be produced. It was necessary to make up the shortage.

The ordinary law of trade was upset, for the prices asked for imported coals would have caused the price of domestic coal to rise in sympathy, had it not been for the individual and Governmental action already referred to. Thus while the price of French coal reached the limiting figures, the price of English coal, in response to conditions of supply and demand, continued to rise until it was 300 per cent. higher than the maximum French price.

Some Coal Prices

As might be expected this situation, which is contrary to all economic laws, causes much trouble and dissatisfaction among the consumers; and the Government has proposed a bill providing for an equalization, after the war, of the prices paid by consumers for domestic and imported coals.

Of the total imports of coal about 1,000,000 tons are discharged at Le Havre or shipped up the Seine to Rouen, and taken thence by canal boats to Paris for distribution by rail. Most of this coal comes from Cardiff, and the prices at Le Havre may be taken as an indication of the conditions in other markets in France.

Previous to the war, freight rates from Cardiff to Le Havre averaged 4s. 3d., or $1.06; in 1916 the rate was 25s., or $6.25. The following increases in coal prices at Le Havre are said to be typical:

	Before the War	Jan. 1, 1915	Dec. 31, 1915
Coal for Navigation and Industries:			
Cardiff (steam) or Monmouthshire	$5.16	$7.28	$11.17*
Newcastle:			
Steam	4.79	6.92	12.14
Gas	4.31	6.68	10.93
Bunker	4.06	6.39	11.90
Coal for Domestic Use:			
Cardiff	10.80	14.08	20.45
Newcastle	9.55	12.73	19.30
Anthracite	13.89	16.01	27.02

* $11.41 for Monmouthshire.

Before the outbreak of the war, the retail price of anthracite coal at Le Havre was 70 fr. per ton ($13.51); at the end of 1915 it was 140 fr. ($27.02), and other qualities of coal advanced in proportion.

The problems of coal importation must be considered from two points of view—namely, during the war and after the war.

Under normal conditions the quantity of coal imported from the United States has been insignificant, although the possibility of developing the trade had been studied repeatedly. Since the outbreak of the war the American coal question has again arisen because of the German occupation of the northern sections of France, as a result of which 68 per cent. of the coal supply of France is in the hands of the enemy. Some of the French railroad companies have ordered American coal, but not in large quantities, and some American coal has been brought over for industrial purposes as well.

The possibility of bringing over a large supply of coal from America depends chiefly on the freight situation. The present transoceanic freight rates are practically prohibitive. Under the conditions prevailing at the time of the commission's visit, it would have been necessary to secure an ocean freght rate of less than $15 per ton, in order to render practicable the importation of American coals, whereas the ruling rates were about double that figure.

There were rumors of the intention of the Government to impose a tax on freights from England to France, in the hope that this might lead to a reduction in the freight rate. Any such reduction, by causing a drop in the price of coal imported from England, would require a further reduction in trans-Atlantic freight rates if the United States is to compete successfully with England.

From information obtained from officers of the Comité Central de Houillères de France (Central Association of French Coal Mines) and from other reliable sources, it would appear that the outlook for coal shipments from the United States during the war would become encouraging only if the trans-Atlantic freight rate should be reduced to approximately $10 per ton to the Atlantic ports and $12 per ton to the Mediterranean ports.

The commission heard of several important contracts that had been made with American companies for large quantities of coal to be delivered over a period of five years, deliveries to begin in the latter half of 1916. In every contract there was provision for a forfeit for nonfulfilment; the forfeits were paid, as the transportation costs rose far beyond what was anticipated when the prices were agreed upon.

Return Cargoes

The present prohibitive freight rates on American coal are due not only to the lack of ships, but also to the fact that it is difficult to obtain suitable return freight from France; for French exports consist principally of fine goods of high value and small bulk. It was suggested that perhaps the following building materials and ores might supply the return freight needed:

Alpha (Not to be confused with alfalfa.)—This is a low-growing, palm-like plant, which is found in Algiers in large quantities. It is convertible into pulp suitable for the manufacture of the highest quality of paper. The material can be had the whole year around. The annual production is now about 117,000 tons, most of which goes to England. A great deal more could be secured for American consumption, and the matter is well worthy of further study. Shipment is made via the port of Oran, and the cost is 70 fr. per ton, f.o.b. Oran. The freight from Oran to England was quoted at 12s. per ton.

Bauxite—This is an aluminum ore, named after Les Baux. It is found in the department of Bouches-du-Rhone, which produced (1912) 6500 tons per year; in l'Herault, 46,000 tons per year; in Var, 203,000 per year—a total of 255,500 tons. Large quantities could be mined in Southern France.

Pyrite—From Algiers.

Tiles—For roof, floor and wall covering. The supply would be considerable, the availability depending upon freight and tariff conditions.

Bricks—The remarks as to tiles apply.

Marble—Since the outbreak of the war it has been found, however, that practically every marble heretofore imported by the United States can be duplicated by American quarries.

Roofing Slate—Dependent upon freight and tariff conditions.

Caen and other Building Stone—It is asserted, however, that a building material, almost identical, can be obtained from Texas more cheaply than this material could be imported.

Higher Mining Costs in Europe

It is not impossible that as available shipping becomes greater and correspondingly cheaper, it may become profitable to ship American coal to France, even in the absence of bulky return freight, as long as the war lasts and perhaps afterward.

The cost of coal production in Western Europe, which had been nearly constant for some years before the war, has risen materially; and competent persons consulted by the commission expressed the opinion that the cost of production after the war will remain materially higher than it was, because labor constitutes such a great part of the cost of mining, and it is likely that labor will be higher after the war. This would be conducive to the importation of American coal were it not for the fact that the cost of production in America is also rising, and may, in fact, increase more here than in Europe. Nevertheless it is possible that foreign coals will be better able to compete with domestic coals after the war.

The chances of success are better with high-priced coals like anthracite, for practically no anthracite coal is produced in France. It is now imported from Wales, but the demand is small.

France needs gas coal and coke. There would seem to be a future for the sale of gas coal, the consumption of which amounts to several million tons per annum. Gas coals must have special qualities; they must have a low ash content and a certain amount of volatile matter. The best gas coals are found in Pennsylvania and West Virginia. Some years before the war a French commission of gas engineers and specialists came to America to determine the possibility of obtaining a supply of gas coal from America, but it is found that although the cost of production was lower in America, the difference was more than consumed by the cost of ocean transportation.

It does not seem that American cokes are likely to compete successfully with Belgian and German cokes, which are of excellent quality and available at relatively low cost.

The production and consumption of coke in 1912 was:

	Tons
Production	3,667,000
Imported	2,789,000
	6,456,000
Deducting exports	197,000
Total consumption	6,259,000

The total area covered by French coal mines is 300,000 hectares (741,000 acres). The mines, which are of medium size, are worked under 300 concessions.

The French Mining Industry

The largest coal basin is Valencienne, which covers 130 hectares (321 acres) in the department du Nord, and le Pas-de-Calais, which supplies 23,000,000 tons or nearly three-quarters of the entire French coal production. The output of the other basins is: Loire, 4,000,000 tons; Bourgogne et Nivernais, 2,400,000 tons; Gard, 2,000,000 tons; Tarn et Aveyron, 2,000,000 tons. There are other small mines in Auvergne, Bourbonnais, the Alps, etc.

The consumption of coal in 1912 was distributed as follows:

	Per Cent.
Metal industry	18.7
Railroads	14.7
Mining industry	8.0
Gas industry	7.4
Merchant marine	2.6
Household purposes	19.2
Sundry	29.4

The industrial regions of France are supplied from the Valencienne basin. The other basins are not as favorably located, and as a result about two-fifths of the French departments imported their coal from foreign countries before the war.

The coal mines are in the hands of old and powerful companies, which have at their service the best technical talent available, drawn from the Ecoles des Mines of Paris and St. Etienne, mining schools which are known throughout the world. There are special training schools for miners at Douai and Alais. Everything that can be done in a technical way to increase the supply is being done.

The miners are highly trained, for the work frequently descends from father to son. The boys begin work at 13 years of age. They pick the coal, but do not descend into the pits before their sixteenth year, at which time they earn 2 fr. per day. The girls begin work in the breakers at 14, and usually continue work until they get married. (In America this work is done entirely by boys.)

About 90 per cent. of the work is done by pick and shovel and very little by mechanical means. The normal wage scale is 3.5 and 6 fr. per day, according to the character of the work and the skill of the laborers. The estimated average wage is 5 fr. per day.

The number of men employed is normally 200,000 (in 1915 only 46,000), and the total wages paid annually, 300,000,000 fr. The additional labor obtainable from year to year has not been sufficient to work the mines to their capacity. It is difficult to enlist new labor in spite of the favorable working conditions.

French mining companies do all kinds of welfare work. They provide workmen's houses at low prices, and make provision for gardens, dispensaries, schools, libraries, social centers, etc. Everything has been done to encourage the organization of coöperative societies to provide supplies. It is stated that 40,000 workmen's houses have been built and rented at from 5 to 8 fr. per month. Provision has also been made for insurance against sickness and accidents, and for pensions; contributions are made by the companies as well as by the workmen, and subsidies are also granted by the Government.

Exportation of American Coal to France

In ordinary times the annual consumption of coal in France is about 60 million tons, of which about 40 millions are produced within the country. The 20 million tons imported, according to the statistics of 1913, were from the following sources:

Great Britain	13,000,000
Belgium	3,700,000
Germany	3,500,000
Other countries	300,000
Total	20,500,000

It will be seen that 360,000 tons coming from other countries is a small portion of what France habitually imports, but even in this small portion the United States had no part. As a matter of fact the United States has not been in the habit of supplying any coal at all to France. About four steamer loads were sent in June, 1914, amounting in all to 34,000 tons; and it is said that the total for the year 1915 was 200,000 tons. Such quantities can, of course, not be considered. The interesting question which arises is, why the United States, a coal producing country, should not be able to enter the French market, for the kind of coal produced in America is in every way adapted to the needs of France.

An examination of the subject reveals two reasons—prohibitive freight rates asked by foreign steamers and the absence of colliers. No other reason is necessary and none can be more striking. If the United States desires to export coal to France, the difficulty of transportation must be overcome, and American coal-carrying boats must be supplied. This is in reality a part of that vital question relating to the American merchant marine. Great Britain supplies the greater part of the foreign coal used in France (13 million tons, out of 20 million in 1913). Great Britain is nearer, has the steamers and easily controls the freight rates.

Another point to be considered is: Were the difficulty of transportation overcome, would there be any particular advantage in entering the French market? Here it is believed that the United States would have an advantage in that the organization of the coal industry is so highly perfected, it could adapt itself to the special needs of French consumers. For example, the manufacture of briquettes from the higher grades of coal would find a large use by the French railroad companies. This would utilize a byproduct (coal dust) from which American producers at present derive little or no profit.

Random Notes

In 1912 France imported about 17,000 tons of coal and 2,800,000 tons of coke, of which Great Britain supplied 48 per cent., Germany 30 per cent. and Belgium 20 per cent. Probably the coal and coke supply for steel making comes largely from the two latter countries, and in this connection the northeastern canal system of France is of much importance, as exemplified by the appearance of the Marine and Rhine canal at Varangeville and St. Nicholas du Port near Nancy. It is capable of handling the heavy freight incident to a metallurgical region to good advantage.

Germany no doubt has a decided advantage in the present state of the war on the Western front, in the possession not only of its own coal and ore supply, but in addition the coal of Belgium and the most important part of the ore supply of France, together with the industrial and metallurgical plants which cluster around such favorable manufacturing centers. The distribution of the raw material for steel making in this region between France, Belgium, Germany and Luxembourg calls attention to their mutual dependence in times of peace.

The Baltimore & Ohio Railroad's New Coal Pier

SYNOPSIS—Description of the new pier, embodying some important innovations, recently opened at Baltimore. The pier has a capacity of 7000 tons an hour and special efforts have been made to reduce breakage to the minimum.

The Baltimore & Ohio R.R.'s new export coal pier at Curtis Bay, in the Baltimore harbor, has a capacity of 12,000,000 tons a year or a maximum capacity of 7000 tons an hour. The pier cost $2,500,000, is of concrete and steel construction and is electrically operated. It embodies a new departure in its construction, being designed to overcome breakage while materially increasing the speed at which vessels may be loaded. With its system of car unloaders, belts and towers it is possible to work on four vessels with cargo coal and bunker fuel at the same time.

The new pier consists of two car dumpers at the land end and a concrete deck 8 ft. above mean tide. On this deck are four loading towers and two trimming towers to which coal is delivered by belt conveyors from receiving hoppers at the car dumpers or from the balancing bin interposed between the dumpers and the pier. The pier is in two units, a car dumper, two loading towers and a trimming tower comprising a unit. Each dumper handles sixty 50-ton cars or forty 100-ton cars an hour. The pier will handle a car 54 ft. in length.

The tracks leading to the dumpers are on a descending grade, cars running to the barney pit by gravity. The barney pushes the cars up a 10 per cent. grade to the cradle of the car dumper. After the car is placed on the cradle, it is clamped and turned upside down, delivering the contents to a counterweighted apron. The apron is raised when a car is being dumped in order to minimize breakage. After the car has been dumped, the apron is lowered to permit the coal to slide freely to the belts that convey the coal to the vessel.

There are three belts to each car dumper, the belts being 60 in. in width, with a capacity of 2000 tons an hour and running 500 ft. a minute. Two in each group run out on the pier to a loading tower. The third runs to the balancing bin.

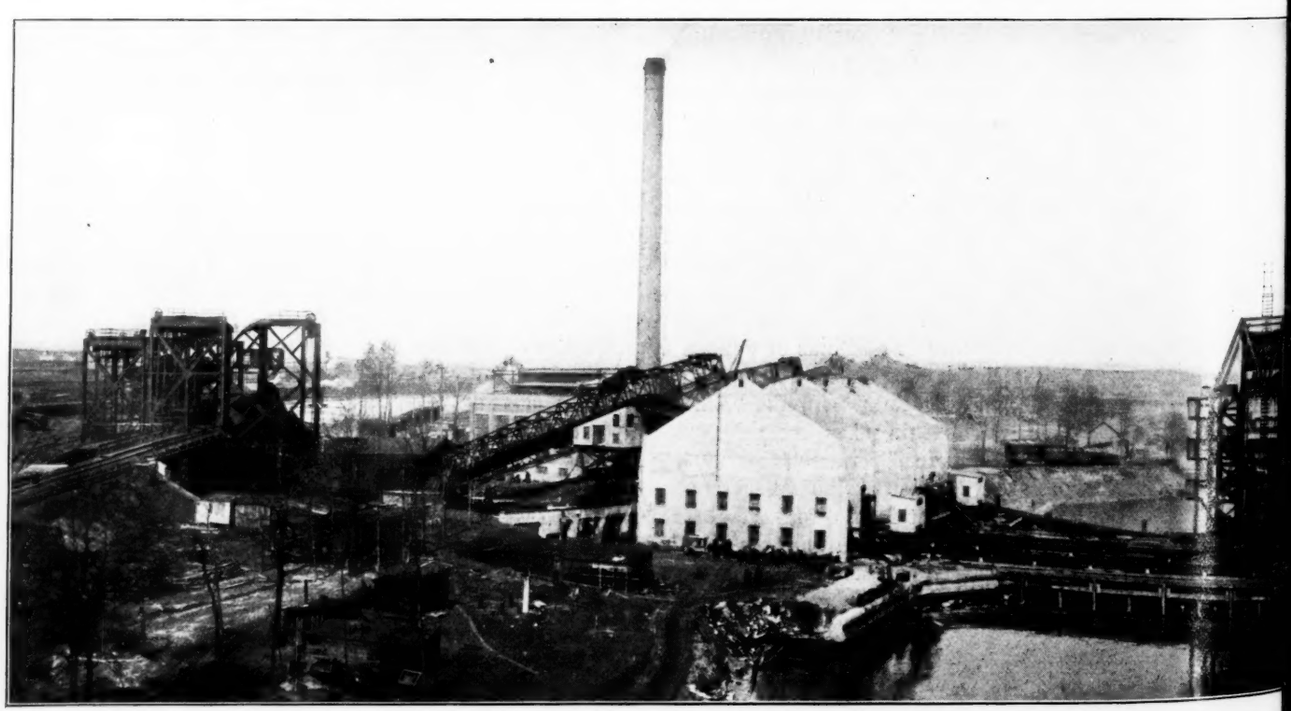
In running the pier at maximum capacity, the operation of the car dumpers must not be interrupted; therefore, when it becomes necessary to stop a loading tower to shift it to another hatch, the coal is placed temporarily in the balancing bin. From there it is taken by a loading tower or trimming tower and placed in the vessel.

A Precaution Against Breakage

The loading towers are equipped with a cage supporting a shuttle ram. The cage is raised or lowered to suit the height of the vessel being loaded, thus providing further precaution against breakage to the coal. The cage has a variation in height of 27 ft., the minimum height above the water being 15 ft. The shuttle ram, which can be run out on either side of the pier, has a maximum reach of 45 ft.

With the towers traveling along the pier in a horizontal direction and the shuttle working in and out at right angles to the direction of the towers, this apparatus will load a hatch uniformly and reduce trimming to a minimum.

The two trimming towers, located on either side of the pier, have belts 48 in. wide, with a capacity of 1500 tons



PANORAMIC VIEW OF THE NEW COAL-LOADING PIER

an hour when traveling at a speed of 500 ft. a minute. Coal for these belts is taken from the balancing bin. The towers have swinging booms 45 ft. long. They are attached at their base to turntables and can be moved in a circle on a horizontal plane. They have a vertical variation of 35 deg. each way from the horizontal.

While the loading towers are working on the cargo the trimming towers are loading the bunker coal. After the loading towers have finished their work, the trimming tower finishes the slow work on the vessel, thereby releasing the loading towers to work on another vessel.

Electric Control Throughout

The functions of the pier are interlocked and controlled electrically by push buttons located every 20 ft. on each belt-conveyor runway. By pushing a button all movable parts of the belt, tower and feeders are stopped.

The operators are located in houses on the shuttles. They first start the shuttle belt; when this is running at full speed the main belt automatically starts, and when at full speed the feeders also start automatically. The shuttle belt runs at greater speed than the main belt, the main belt running faster than the feeders, so there is no danger of flooding the main or shuttle belts. A master control of the pier is located in the superintendent's office, enabling him to establish the maximum speed at which the belts are run.

Another device to overcome breakage is a "lowerator," which will be attached when lump coal is being loaded. The lowerator deposits coal in the vessel with a drop of but 3 feet.

Two tracks leading to the car dumpers are covered by a steel-and-concrete thawing shed with a capacity of 22 cars, into which cars are placed in severe winter weather. Coal placed in this house where the temperature is kept at 180 deg. for 30 min. will thaw out sufficiently to free itself. Both the thawing shed and car dumpers are operated by steam.

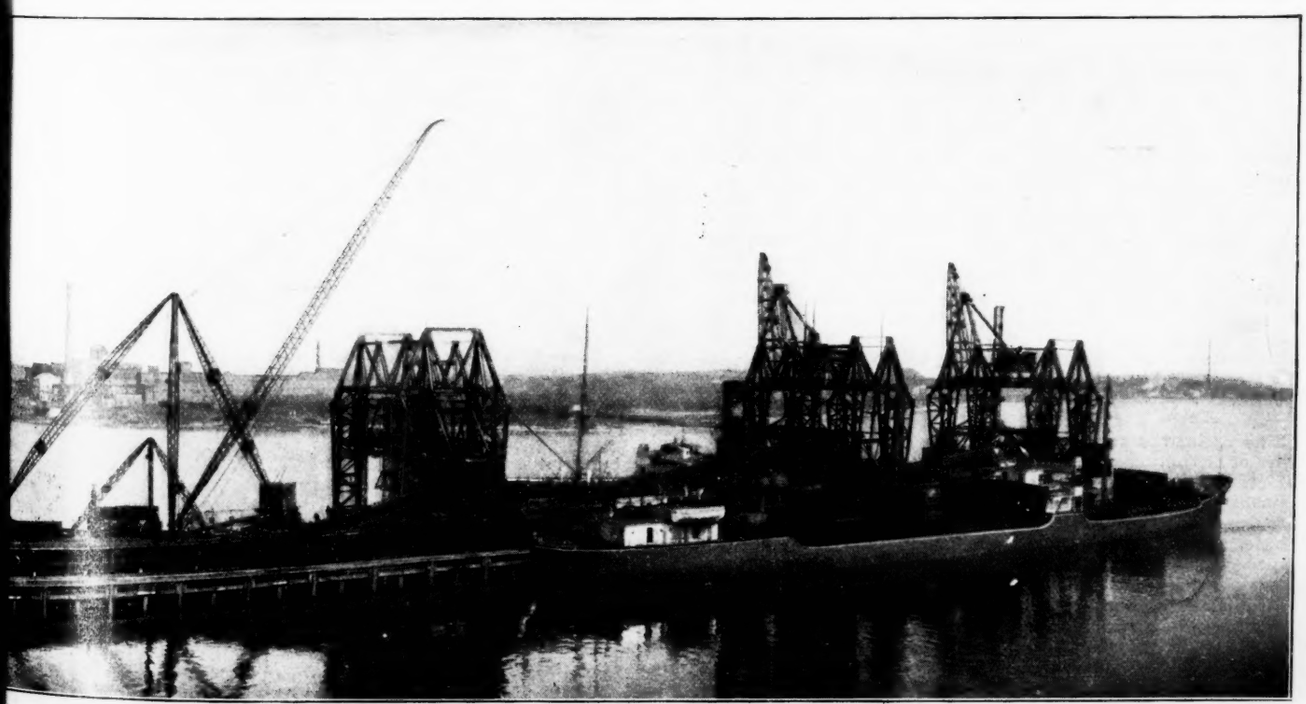
Fireclays That Are Mined

Most of the well-known brands of Scottish firebrick, "Glenboig," "Stein," "Castlecary" and "Hurll," are produced from deposits that are mined on a system similar to that by which coal is mined. In Canada, in the search or so-called fireclays, attention appears to have always been directed to surface clay deposits. In view of that fact a reminder that such clays occur otherwise may not be amiss.

As applied to an underground deposit, the word "fireclay" is probably a misnomer; but it has grown up through use and will probably be retained. In Scotland a fireclay is a gray, greenish rock with a soft soapy feel, tough rather than hard, which occurs in beds of varying thickness throughout the Carboniferous system. Where the coal seams are well developed so as to form workable areas, the fireclays are prominent as underclay beneath the coal, and where of sufficiently good quality are worked in conjunction with the coal.

It is not, however, in the coal measures that the fireclays attain their greatest development, but in the Millstone grit, a generally barren subdivision of the Carboniferous system lying below the Upper Coal measures and above the Lower Carboniferous measures. These measures outcrop to the northeast of the City of Glasgow, and here the fireclay beds are worked entirely for that product. The seams are 4 ft. in thickness (they may be more and are sometimes less) and in a few instances ordinary coal cutters are employed to undercut the bed. If water is present in the strata, the fireclay workings become regular quagmires, owing to the exposed clay working up with the moisture; but where dry, the workings are pleasant to work in, as there is no dust and they are soft to the feet.

This rock is first ground, after which it goes through the regular brick-making processes. Castlecary property, a small area, produces coal, fireclay and limestone from the one shaft. This is probably unique.



OF THE BALTIMORE & OHIO R.R. IN BALTIMORE HARBOR

The Labor Situation

General Labor Review

Umpire C. P. Neill, of the Board of Conciliation, has decided that if the rate sheet of a colliery does not fully reveal the whole practice of payment at that operation, its terms may be supplied by evidence; but this evidence has to be strong if it is not backed by a record on the rate sheet. The inadequacy of the rate sheets as filed will probably be corrected gradually until the uncertainties now existing are ended.

A claim was recently brought before the same umpire, complaining that certain miners employed at the No. 4 colliery of the G. B. Markle Co., at Jeddo, could not earn a fair day's wage because of alleged abnormal conditions, but the company's foremen and some of the miners declared that men had performed similar work using coal- instead of rock-drilling machines and had no cause for dissatisfaction. The complainants admitted that they had never tried coal-drilling machines.

Miners Must Use Proper Machinery at Work

In a decision made Mar. 17 the umpire declared that where a grievance is presented asking for a change in conditions and demanding a new basis of payment, the burden of proof rests with the plaintiffs. He also declared that the miners must equip themselves with the proper tools and use intelligent methods of working. This decision and that relating to the setting up of chutes show that Neill is disposed to give fair judgment. Part of his difficulty is believed to be because of his lack of practical mining knowledge, which fault is slowly being corrected. Neither side should take advantage of his difficulty in this respect to urge something which they know the contracts do not, and were never intended to, mean.

Seventy hoisting engineers at the mines of the Lehigh Coal and Navigation Co., in the Panther Creek Valley, quit work on the morning of Mar. 16 and laid one hundred times that number of men idle. It is obviously a crime for men working under an unexpired contract to go on strike for terms not allowed by the contract and thereby inflict idleness on so large a body of men.

Kennedy Hustles Engineers Back to Work

Thomas Kennedy, president of District No. 7, in which the strike occurred, took immediate action. He ordered the striking hoisting engineers back to work and promised that if they did not do as ordered he would fill their places with 70 other union men. In future all grievances will be taken up with the officials of the company or referred to the board. The union is determined to suppress the petty strike nuisance, for it has become unendurable. One class of labor after another starts a little strike of its own and the great mass of men—in this case 7000—stands idle.

The company regarded the constant interference with growing disgust, and when the engineers quit, the management made no attempt to have the pumps operated, but removed all the mules from the mine, and also the motors and other machinery. The mines were already beginning to fill with water when the men on the 3 p.m. shift returned to work in compliance with Kennedy's orders. The engineers ask for $100 a month, and rather than comply with this demand Edwin Ludlow, vice president of the company, threatened to flood the mines.

Union Men Fill Places of Striking Firemen

The firemen at the Draper, Gilberton and Boston Run collieries of the Philadelphia & Reading Coal and Iron Co. walked out on Mar. 13 and laid those plants idle. Other employees immediately manned the boilers and the collieries continued in operation. The firemen want their wages raised from 27 to 34c. per hour. The collieries affected are located near Mahanoy City in the Middle Western anthracite basin. There seems a general leaven of unrest in the engineering departments of all the more southerly anthracite fields.

To show how annoying these strikes are it might be permissible to recall the recent strike for higher pay of 300 breaker boys at the Archbald, Pyne and Taylor collieries of the Delaware, Lackawanna & Western R.R., Coal Department. Each immature boy taking part in that strike caused the idleness of a hundred full-grown men. A score and half of boys made 3000 men idle.

The strike was clearly in violation of the agreement; it sought to establish a new scale in place of that provided in the contract, and it endeavored to obtain that establishment by a strike. An unlawful end, in short, was sought by means of an unlawful conspiracy.

Fortunately, pressure was brought by the labor leaders to correct a situation doubly violative of the honor of the union, and the breaker boys were given every assurance by the colliery committee that it would attempt to secure by conference what could not be made the subject of a demand with any show of justice. As the result of a meeting held with District President Dempsey and David Fowler, the Taylor boys were the first to go back to work. The Pyne boys then decided to call their strike off.

Little Breaker Boys Now Breaker Youths

The boys claimed that since the laws regarding child labor had been changed more mature boys had to be used in the breakers. They urged that this fact should be considered in determining the wage. The lowest wage paid was 9c. an hour, but only a few were paid as little as this, the greater number of the boys receiving 10c. an hour or over.

The law has not been changed since the agreement was made, and the boys should have sought a better wage when the contract was under consideration. A new condition might justify a modification of the agreement; no one can say how far the operators should go in enforcing an agreement when conditions change most radically. But in this case there was nothing new except the rise of a restless spirit among the boys. The cost of living was not a point at issue; if it had been it should have been considered in reference to all and not to a few employees.

Storrs Secures a Whole Week of Labor Peace

The striking miners at the Storrs colliery of the Delaware, Lackawanna & Western R.R., Coal Department, near Scranton, Penn., acting on the advice of Stephen Reap, a member of the official board, went back to work on Mar. 17 determined to work one week and go on strike at the end of that time if all grievances were not adjusted.

The trouble is about certain alleged back pay due to the mine workers. The men in mines Nos. 1, 2 and 3 have agreed to come out together if they cannot have what they demand. This strike, should it occur, will affect 1200 men and boys.

The Freeland Borough authorities recently presented a bill for $25 to the United Mine Workers for the use of the borough hall. The union recalled the fact that the land on which the hall was built was given to the municipality 30 years ago by the Knights of Labor, an organization then quite strong in the anthracite region, but now disbanded. The grant required that the structure should be open free for the meetings of labor and literary organizations. Thomas Kennedy, president of District No. 7, received a cancellation of the bill. The dispute revives the memories of long-past labor difficulties and struggles in the anthracite region.

Despite the opposition of the miners of the Lehigh Coal and Navigation Co. to working on Saturday afternoon, the company managed to keep the mines going all last Saturday, but No. 10 had to suspend owing to an accident.

These Men Don't Strike; They Stay by the Fire

The Rochester & Pittsburgh Coal and Iron Co. mine workers at Eleanora and Adrian mines, Jefferson County, Pennsylvania, are making trouble again. They are practically seeking a new contract. They want increased compensation for mining pillars and want mule drivers paid from the time they take the mules out of the barns until they put them back again. The company promised to confer with the men, but meanwhile the mine workers stayed at home.

Three months ago this same company had a strike at the two mines just mentioned, and also at Florence. B. M. Clark, who is attorney for the company, filed suit against each miner individually and against the local union, charging breach of contract. The miners went back to work and the company failed to press the suit. But the case is still pending and the men are afraid it may be revived into full activity, and so this time they have not declared a strike, but remained quietly at home awaiting compliance with their demands.

The Eriton mine of the Northwestern Mining and Exchange Co., a corporation affiliated with the Erie R.R., as the name

shows, was the scene of a strike on Mar. 15. The men claim that eight motormen were discharged for insufficient reason and they demand that they be reinstated. The mines are in Clearfield County and employ about 600 men.

The miners at Arnot, Tioga County, who are working for the Blossburg Coal Co., an affiliated company under the same management, are on strike because the company set the date for the bonus on Feb. 15 instead of on Jan. 1, as was generally customary in central Pennsylvania. The Blossburg Coal Co. operates at a point quite distant from the Clearfield region, and the market for the coal is wholly different. The company was not in any way bound to grant the bonus when it was given in Clearfield County. The Arnot men have always been prone to strike, and strike hard, and have suffered much as a result of their determination.

This present strike is entirely without excuse. The Arnot men have been given more than the men in western Pennsylvania, Ohio, Indiana or Illinois, and they have 10 per cent. more than their contract would afford them. There is therefore no possible justification for remaining idle.

In the Somerset County field, the Coal Operators' Association has just announced a wage increase, affecting about 18,000 employees. No change has taken place in the labor situation.

More Ambiguity in Wage-Scale Contracts

A mass meeting of Pittsburgh district miners took place at Monongahela City on Sunday, Mar. 18. To this delegates had been appointed by the locals. The purpose was to demand an increase in the wage scale. The district officers and the more conservative members of the union do not recognize the movement, as it is started to secure a change in the wage contract, which has yet a year to run.

It might be well here to detail the standing of the miners and operators in the dispute existing regarding the introduction of electric lamps and permissible explosives into mines which did not have them at the signing of the contract. The mine workers claim that no operator can introduce these innovations unless the men are willing.

The agreement says: "Where electric cap lamp is substituted voluntarily on the part of the operator for an open lamp a charge of 5c. per shift per lamp shall be made." The sentence is "wonderfully and fearfully" written. The reader of it naturally asks, If the miner compels the operator to install lamps when he is unwilling, that is, involuntarily, is the operator compelled to let the miner have his lamp free? The miner has some justification in wondering what such a slackly written sentence means. He quite naturally says: "I should pay for the lamp if I volunteer to use it, but not if I don't want it." The words "on the part of the operator" seem added to twist the meaning. The words "electric cap lamps shall be substituted for safety lamps" seem to imply that the operator has no choice at all, but must put electric lamps in everywhere in place of safety lamps.

The contract says nothing about permissible explosives except that they and detonators shall be furnished to the miner at 5 per cent. above cost price. In addition to this, provisions for determining the cost price are given. But nothing is said anywhere to show who is right and who is wrong in the contention that either party can write its fiat or put its veto on the use of permissibles. That omission might be excusable, but the poor wording of the clause regarding safety lamps is without excuse.

The drivers of the Pittsburgh Coal Co.'s mine in the Pomeroy Bend, in southern Ohio, struck on Mar. 13 for $3 a day instead of $2.40, which they are at present receiving.

An Analysis of What the Kanawha Miners Want

On Mar. 15 a sub-joint scale committee composed of three representatives of the mine workers and as many of the coal operators met at Charleston to consider the new scale which the Kanawha operators and miners are to sign. The mine workers' representatives are A. C. Porter, of Coalburg; Thomas Cutts, of Coal River, and Joe Brunetter, of Burnsville. The operators' representatives are Michael Gallagher, of Paint Creek, W. Va.; Quinn Morton, of Burnsville, Ohio, and O. E. Dana, of Cincinnati, Ohio.

The "full and complete recognition" of the United Mine Workers of America is one of the leading demands. What more recognition than what it now has can the union want? The check-off has already been granted, but with the restriction that the dues and assessments collected by check-off shall not exceed $1.10 a month, or 55c. a pay. It is, moreover, collected only on "the voluntary individual order of the person from whom the pay is deducted." These restrictions the union would in all probability sweep away. The unlimited check-off and the closed shop are conditions which seem to be regarded as integral parts of what is redundantly termed "full and complete recognition of the union."

The wage increase asked—"10c. a ton on all pick- and machine-mining tonnage rates"—though large, is not figured in the form of a percentage. It is for that reason to be commended. The old rate for machine loading in rooms in the Kanawha thick vein was 31c., cutting was 6½c. per ton. The mining and loading rate was therefore 37½c., and will be 47½c., an increase of 26.6 per cent. if the mine workers get what they ask. In the Coalburg seam pick mining was 56½c.; it will now be 66½c., an increase of 17.7 per cent. The change will therefore make machine places in the Kanawha seam much more attractive to the workingmen.

Kanawha and Pittsburgh Wage Scales Compared

The wages in the Pittsburgh region which the Kanawha day workers are seeking are much higher than along the Kanawha River. Thus, motormen in the Pittsburgh region receive $3.10 and in the Kanawha region $2.55 per day, and the day is longer. Trappers at 87c. for nine hours are seeking $1.31 for eight hours, and so forth. The arrangement being only for a year, the Kanawha agreement will now line up with the other agreements in the central competitive field and with the agreements on Cabin Creek and Coal River. The contract, yet to be made and signed, will cover the Kanawha River and Little Coal River. The men along the Gauley River are also seeking to make a contract. These men were formerly in District No. 29. This small district has recently been merged with District No. 17.

One of the demands of the Kanawha mine workers is that all coal shall be weighed and paid for on a mine-run basis of 2000 lb. Under the present scale only the splint, or hard coal, is paid for on a run-of-mine basis. The expiring contract says: "Screened lump coal may be mined, provided the increased rate paid for screened lump shall be according to the percentage of screenings in producing screened lump as against mine-run coal." Nine hours at the face constitutes at present a day's work. As noted last week, the Kanawha mine workers now demand an 8-hour day.

Illinois Has a Comfortable Little Purse

The frugal Illinois district of the United Mine Workers has $1,427,587.50 in the treasury. Walter Nesbit, the new secretary and treasurer, will receive this large sum of money, and probably more, from Duncan McDonald when he takes charge of the finances. The income from Aug. 1, 1916, to Jan. 1, 1917, was $381,806.85, and the expenditures during the same period were $226,892.53, showing a growth of $154,914.32 in five months, or at the rate of about $375,000 a year.

A bill is pending in the Missouri legislature which requires employers to pay discharged employees all wages due them within 24 hours after the severance of relations. Failure to do so entitles the employee to a continuation of pay for 30 days from the date of discharge, unless suit be instituted by the plaintiff within that time. In addition the employee may sue for damages sustained by failure to receive his wages within the 24-hour period. Labor Commissioner William H. Lewis has issued a bulletin explaining the law and urging its passage.

White Stands for Unbroken Contract in Southwest

An eight-page bulletin dealing with the tendency among coal miners to strike, and urging them to stick to their contracts, to the organization and to the accepted methods of settling strikes and differences, has been issued by the authority of the international and district organizations of the United Mine Workers of America.

The pamphlet states that insidious influences have been brought to bear in the coal fields of the Southwest for the purpose of promoting dissatisfaction among the mine workers. As a result, no attempt is made to settle disputes through the regular channels provided by the organization. The rank and file is advised for its own protection to uproot these injurious influences.

The bulletin was prepared by K. C. Adams, national publicity director, under instruction from John P. White, international president of the United Mine Workers of America, and in pursuance of the decision of the heads of the union to stamp out a condition which has become only too frequent in the Southwest. A copy will be placed in the hands of every coal miner in District No. 21, which comprises the States of Texas, Oklahoma and Arkansas.

W. R. Fairly and Hywel Davis, representing the Department of Labor, are in McAlester, Okla., endeavoring to adjust the differences between the coal miners and the McAlester Coal Co. in the mines of the latter at Pittsburg, Okla. The Pittsburg mines have been idle for nearly two years on account of a strike over local and minor differences, and all efforts at arbitration during these two years have failed.

Bruceton Test of Clearfield Dust

SYNOPSIS—The test of the dust from the Clearfield mines that has aroused so much discussion was only a part of a long series of experiments to determine under what conditions dust is explosive. While the experiment was in no way secret, the disclosure of the results was merely incidental.

An interesting discussion has arisen as to the explosibility of the dust of the Clearfield region of Pennsylvania, and some have been disposed to question whether the Bureau of Mines should have disclosed the results of an experiment in which the conditions were made so favorable for an explosion and so nontypical of Clearfield mine workings, as actually existing. It is quite generally said that nothing of a practical value could be drawn from the facts presented.

This article is not intended to discuss the main issue, but rather the exact conditions under which publicity was given to the experiment in the issue of *Coal Age* of Nov. 25, 1916, Vol. 10, page 890. In that account occurs the following paragraph:

> Clearfield dust that was placed in the [Bruceton] mine was exploded in no uncertain way. However, the conditions under which the experiment was carried out were propitious for such an explosion. Do such conditions actually exist in any of the Clearfield mines? Mr. Rice and his assistants were noncommittal in so far as their opinions in the matter were concerned.

In the Dec. 23, 1916, issue, Mr. Verner, referring to that particular experiment, said:

> The test was made to determine whether or not the dust from the Clearfield mines was explosive. . . . It was to settle this disputed point that the Bruceton test was made.

As a result of inquiry, it may be stated for the benefit of Mr. Verner and others that this was simply one of a group of tests on coal dust from the Clearfield district that happened to have been observed by a representative of *Coal Age*. Otherwise no public announcement would have been made of this or any isolated test. The bureau is regularly making tests of coal dusts from different parts of the country, representing coal of different characteristics, and in which the ratios of volatile to total combustible matter vary widely.

In gathering samples for such tests with the coöperation of the operators who furnish them, the bureau has always sent an engineer to sample carefully the road and rib dusts of the mine between the face and the shaft or drift mouth, so as to determine as nearly as possible the size and character of these dusts. All this is given careful consideration, but the bureau has refrained from drawing conclusions on any particular dust until the whole matter could be thoroughly studied and made as practical as possible.

A large bulletin covering the data of several years of investigation would probably have been issued before now but for the sad death of George S. Rice's chief assistant, L. M. Jones. This seriously complicated the assembling and grouping of the large amount of data which had been obtained, and which it is believed is fundamental to the study of coal-dust explosions. Though important facts have been developed from time to time, the bureau has gone slowly in the matter of publishing conclusions. In this it probably showed good judgment, but the bureau now believes that the chief phenomena of dust explosions and the principles underlying the methods of their prevention are fairly well understood, though of course many fundamentals in the process of explosive combustion of the dust have not yet been reached. In the meantime the bureau has not hesitated to give advice based on such facts regarding the prevention of coal-dust explosions as have been established. This information has been given to operators whose mines have been investigated, and to the public, through the medium of miners' circulars and technical papers.

Clearfield Test Not Made for Insurance Men

The bureau has not in any way entered into any dispute which may have arisen between the insurance companies and certain operators in the Clearfield district. No one who is familiar with the work of the bureau would believe that such a dispute would in any way influence the method of testing or the character of the findings.

Referring to the letter of "Fairplay" on page 108, *Coal Age*, Jan. 13, 1917, in which it is stated:

> What will surprise the operators and mining men of the Clearfield district generally will be to learn that it was considered necessary by the Government experts to make such a test.

In specific answer to this question, the object of the bureau investigators was to test the dust of a coal of a certain type. No cause is hurt by the establishment of a truth. It is the taking of only a part of a truth and ignoring the other parts that gives trouble. The purpose of the particular test, which was one of a series to which the Clearfield operators were invited, was to determine one point of the explosibility curve of a certain sized coal dust of a special kind of coal, by mixing it, if circumstances required, with a certain proportion of inert material.

As a matter of fact, pure coal of which 20 per cent. passed through a 200-mesh sieve was used on this test. In a succeeding test the quantity of shale dust was raised to a point where it did not propagate. Thus certain definite information was obtained. In the same way, if one were testing the explosibility of certain gas mixtures, like methane and air, a test would be made with a 6 per cent. mixture; then, further, an experiment would be made to see if it would explode with a 5 per cent. mixture; whereupon, if that did not explode, the conclusion would be that the limit was between 5 and 6 per cent.

Yet because the sample of methane came from a particular mine, one would not dream of saying that the mine was dangerous on account of the gas. There may be found a parallel in the situation in the central Pennsylvania field and in the sub-bituminous or lignitic coal districts of the Rocky Mountain region, in which there have rarely been mine explosions, although these phenomena have been only too frequent in some of the adjacent bituminous mines. Yet fine, dry, pure lignitic coal dust will explode with great violence, as is shown by tests and by actual explosions in the lignite-briquetting works of Europe. The reasons for comparative immunity from mine explosions of any particular district or coal bed must be sought if the bureau's investigators are to assist in reaching the fundamental causes.

The method of testing is entirely open to the observation of any who are interested in such problems, though the detailed information is given only to the operator who furnished coal for testing. There are two classes of tests which are made on all coals—one to determine the explosibility limit of the finely pulverized dust, and the other to determine the explosibility limit of dust of a size and degree of moisture duplicating as far as possible the condition of the dust as determined by the sampling of the mine from which the coal was taken.

Without consideration of all these factors it is a mistake to pass on the merits or demerits of any particular test. It is perhaps regrettable that this was not made clearer in the brief statement by the representative of *Coal Age* in the Nov. 25 issue. Naturally, the bureau investigators were "noncommittal" as to whether "such conditions exist in any of the Clearfield mines." If they knew that they did or did not exist they would not be permitted to state it, except confidentially to the operator who furnished the coal.

Who's Who In Coal Mining

Eugene McAuliffe

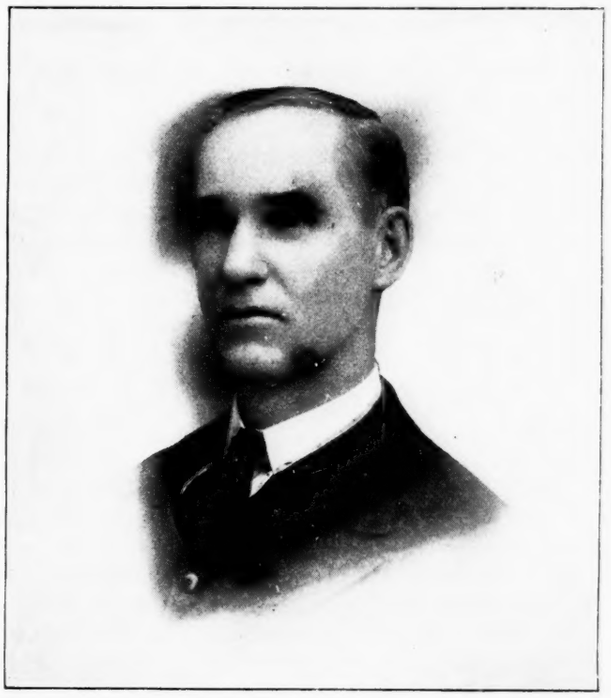
After substantially a lifetime connection with various railroads and 23 years' continuous employment with the "Frisco" lines, Eugene McAuliffe, of St. Louis, has resigned as general coal agent of the "Frisco" to become vice president of the West Kentucky Coal Co., with headquarters at Paducah, Ky.

Mr. McAuliffe has had an interesting career. Born in London, England, in 1866, he came to America and entered the service of the Northern Pacific R.R. as a shop apprentice in 1884. Later he worked as a locomotive fireman, then as a locomotive engineer, and in various other capacities in the mechanical and operating departments of several roads in the United States and Mexico. In 1894 he became connected with the K. C. F. S. & M. R.R., now part of the St. Louis-San Francisco Railway Co., and was appointed fuel agent of the "Frisco" in 1903.

In 1908 Mr. McAuliffe became general fuel agent of the Rock Island, Frisco, Chicago and Eastern Illinois and affiliated lines. In 1910 he was president of the Brazil Block Coal Co. and general manager of the Crawford County Mining Co. He retired from the Brazil Block Coal Co. in 1912 when that concern closed out its mining operations. He continued, however, as general coal agent of the Frisco until Feb. 1 of this year. His duties consisted of handling locomotive and shop fuel purchases. He also had charge of coal traffic and coal-mine development work.

In 1908 Mr. McAuliffe organized the International Railway Fuel Association, serving as president of that body from 1908 to 1910. Besides being a member of a number of railway societies, he belongs to the American Institute of Mining Engineers. In Kentucky he is connected with a corporation operating nine mines in Webster, Union and Calhoun Counties, carrying a coal reserve of 35,000 acres, or approximately 250,000,000 tons.

The West Kentucky Coal Co. owns the railroad that serves all its mines and makes delivery to the Illinois Central and the Louisville & Nashville Railroads at Sturgis, Wheatcroft and Clay, Ky. It also delivers coal to the company's river tipple on the Ohio River at Caseyville, Ky., from which point five steamers and some 250 barges transport a material portion of the production to Paducah, Ky.; Memphis, Tenn.; Greenville, Miss.; Donaldsonville, La., and intermediate points. The West Kentucky Coal Co. is controlled by the North American Co., J. P. Mortimer, president, 30 Broad St., New York City.



EUGENE McAULIFFE
Vice president of the West Kentucky Coal Co.

Meeting of New England Coal Dealers' Association

The sixteenth annual convention of the New England Coal Dealers' Association will be held at Horticultural Hall, Boston, Mass., on Mar. 28-29.

On Wednesday, Mar. 28, at 2 p.m., reports will be made by officers and committees, to be followed by an address on "The Successful Fuel Briquette," by A. L. Stillman. The question box will be started at this session. The banquet in the evening will be held at the Revere House, at 6:30 o'clock.

On Thursday, Mar. 29, at 10:30 a.m., the report of the nominating committee will be read, followed by the election of officers. In the afternoon, at 2 o'clock, Edward W. Parker, director of the Anthracite Bureau of Information, Wilkes-Barre, Penn., will make an address. An exhibition of coal-yard supplies and coal-handling machinery, trucks, etc., will be held.

Assault Upon Miners by Unionists—Persons who encourage an assault and battery upon a miner by words, gestures or signs under a scheme to terrorize him into becoming a unionist, are liable as principals in the assault, although they did not actually participate in the violence, it being sufficient that they be present and abet the offense. (United States Circuit Court of Appeals, Eighth Circuit; Cisco vs. Looper, 236 Federal Reporter, 336.)

Editorials

Federal Commission's Ruling on Anthracite Prices

Early last week the anthracite trade was quite unsettled by the report of the Federal Trade Commission, which announced that the mining companies would not be justified in increasing the price of coal by withdrawing the usual spring discount. There was a tendency to take it for granted that this settled the entire matter, and cancellations of orders on this account were quite common. Later the buyers began to realize that while the commission did have strong inquisitorial powers, it was nevertheless powerless to enforce its findings.

The findings of the commission as to the cost of production were based upon information gathered in the last four months of 1916, and expenses have arisen since then and continue to rise even at the present time. It has also been stated that at the time the state tax was refunded by the shippers this commission recommended that the dealers return the tax to their customers, but it later developed that most dealers had never charged it to their customers.

However, many of the agencies and others high in trade circles who a few days ago were predicting there would be no reduction, seem to have changed their opinions. If the prices are not to be reduced, it is likely some announcement would have been made before this. As this feeling grows in trade circles, orders for hundreds of cars have been cancelled with the larger companies; but as their books are so crowded with orders, a loss of 50 per cent. would still leave them with plentiful business.

Carbide Lamp Test for Depleted Air

The popular fallacy that the acetylene flame does not provide an adequate test for depleted air—that is, an atmosphere containing insufficient oxygen—cannot be too strongly contradicted. This was one of the early objections raised to this type of lamp, and one which still persists in some sections.

As pointed out in the recent paper by Edwin M. Chance, published in the *Bulletin* of the American Institute of Mining Engineers, a man's life is not endangered until the oxygen content falls below 10 per cent., while the acetylene flame requires about 12½ per cent. oxygen to maintain it. This, of course, runs closer to the danger line than the amount of oxygen required by the oil flame, which is about 17½ per cent.; but, on the other hand, there is a very distinct change in the color of the acetylene flame when the oxygen content falls to 14 per cent., which should provide an adequate warning. It is true the warning is not of such a peremptory character as in the case of the oil lamp, but the latter has a very distinct danger attached to it. Thus, the miner has found that the 17½ per cent. oxygen content of the air necessary to sustain the flame in the oil lamp provides a large margin of safety; and it frequently happens that when he is endeavoring to reach a certain point he will continue beyond the place where his lamp has gone out, taking the chance of encountering a lethal atmosphere.

The acetylene lamp, with its initial warning when the oxygen content falls to 14 per cent., and its final decisive warning at 12½ per cent., certainly presents a more positive warning than anything else of a practical nature that has yet been devised. Irrespective of whatever else may be said for the carbide lamp, this point alone is a strong recommendation for its use.

What Ails the Railroads?

The report of the United States Geological Survey of the coal and coke movement for February, 1917, is not reassuring. A public is clamoring for coal and is informed that the industry produced not more, but less, than in 1916 and less than in the preceding month. The decrease in shipments of bituminous coal in February, 1917, compared with January, 1917, was 15.5 per cent.; compared with February, 1916, it was 9.4 per cent.

The mine operators are doing their best; the mine workers never had less strikes, and the whole trouble is with the railroads. It is not easy to analyze just what part of the railroad system is most to blame—shortage of cars, of motive power, sidetracks, yards or what. Something is wrong, and the railroads are depriving themselves of a harvest which is rightly theirs.

The roads appear to have handled their business so poorly that they cannot do so much as they could when a lighter demand was made upon them. Only in Kentucky and Alabama do transportation conditions appear to be as good as a year ago, the worst falling off appearing in Pennsylvania, with the group West Virginia, Virginia, Maryland and Ohio a close second.

The railroads have finally agreed, as the result of pressure from the "Big Four" unions, to grant what amounts to an increase in wage. There is no good reason why it should not have been granted, in view of the increase in the cost of living and the universality of other wage advances. But the right of the railroad to increase rates proportionately, especially where traffic is not profitable, should be conceded.

Just now the railroads are making money, and it would be only right to require of each and all of them individually that they provide for the press of business by increased trackage and equipment, wherever need appears. There has been a disposition to belabor the railroads, but it should be

That Success Number

Don't forget that the April 7 issue of "Coal Age" is the Annual Success Number. This year's special issue will eclipse the interesting number published last April. Watch for it, and read all the valuable articles it contains.

resisted. No one can imagine what a burst of indignation would have been levied against the railroad business had it raised its tariffs as much as bituminous producers have increased the price of bituminous coal, which by the way, the railroads have to buy.

It is to be hoped that all those merchants, selling coal or other products, who have benefited by the present high prices may join in the movement to secure railroad rates adequate to make railroad operation profitable not only at times of high pressure like the present, but when times are normal or not good.

The country will never get rich by treating any industry with injustice. There is a theory, standing on some fairly good ground, which is called the doctrine of economic determinism. It says that the quality of the work of a man or an industry is determined by his or its economic opportunities. Starve a man and you get only a starveling. Restrain a man and you get a weakling. Bulldoze a man and you get a coward.

Starve, restrain and bulldoze the railroads of the country and you get a transportation service which falls down in every emergency. We have starved most of the railroad corporations to death. Like the horse that had become accustomed by progressive feed reduction to satisfy himself with one straw a day, and died when the consummation was reached, so the railroads restricted, hampered and harassed have arrived almost to the same bitter end and to a point of inefficiency which the apostles of economic determinism have long anticipated.

Just think for a moment. Transportation is what we want: not more coal mines and not more manufactories, but more transportation. But we cannot get it because we withhold profit from those who would provide it. Every one spends his savings in more coal mines and more factories, thus still further overloading transportation and not helping it to bear its burden.

It is a sorry state of affairs and one that does not reflect favorably on us as an intelligent people. We speed up the overspeedy and slacken up the tardy, and wonder why we don't get better service. We need a new light thrown on our national motion studies. More work for the railroads day by day and year by year. Less money spent on the railroads, less money earned by the railroads, year by year. Where will it end? What good will it do? Surely this is a fair question to put to the Interstate Commerce Commission.

Extraordinary Coal Shortage in France

The accompanying illustration shows a group of men and women in front of the Grand Opera House in Paris, waiting their turn to get a few pounds of coal. Contrary to the accepted rules of "bread lines," the people in line have not the appearance of being improvident, but on the other hand, show every indication of being in comfortable circumstances. To coal consumers in this country, accustomed to consider their fuel supply in terms of tons or railroad cars, or even train loads, this detail of the ravages of war would appear absurd were it not for the tragedy behind it.

The American coal exporter has been keenly alive to the conditions existing in France for some time, and has

A LINE AT THE GRAND OPERA HOUSE IN PARIS, MADE UP LARGELY OF WOMEN, ALL WAITING TO GET THE "CARDS" WHICH ALLOW THEM ONE SACK OF COAL APIECE

no illusions about obtaining any very material and permanent benefit therefrom. The wily Briton just across the channel, with a normal freight rate of only a trifle over a dollar a ton to land his coal on French soil, will prove a stumbling block to the development of any important or permanent business with America. Nevertheless, the situation has certain possibilities and is one of particular interest, at this time.

The article appearing elsewhere in this issue, "The Coal Situation in France," is under these circumstances of special interest. The text has been abstracted from an exhaustive report published in book form by the American Industrial Commission, which was sent to France by the American Manufacturers' Export Association to study the possibilities of developing opportunities for American products. While the coal section could have been covered more advantageously had the commission included a coal man among its members, it is nevertheless a valuable contribution to the literature on this subject. The commission, no doubt, had access to special information, and the report shows a painstaking effort at accuracy and a gratifying conservatism in its conclusions.

Perhaps one of the most interesting points brought out in this report is the extraordinary high prices now prevailing. The commission shows that during various years from 1893 to 1912 French coal prices fluctuated from $2.10 a ton to about $3.10. At the time of the commission's investigation, coal from foreign sources was selling as high as $29 and more per ton. It is believed that some extraordinary further advances have been made since that time; but even under these conditions it is easy to understand how coal at 1½c. per pound would result in the situation pictured here.

The commission offers only meager encouragement for American exporters to participate in the French coal trade under existing conditions. It finds that American operators will have to obtain a freight rate of $15 per ton or less to France, whereas rates at that time were about double that, while the current market is from $50 to $60 per ton. It is even pointed out that some American companies having contracts in France have been compelled to make forfeits on these. An interesting phase of the report is the review of the possibilities of obtaining return cargoes for coal vessels to France; but even in this respect there is little encouragement held out.

It seems that France will never be entirely independent of other countries for her fuel supply. The French consumption previous to the war was in the neighborhood of 60,000,000 tons per annum, about one-third of which she was importing, mostly from Great Britain. In spite of aggressive efforts to make up this deficiency, in the shape of Government subsidies and special inducements to stimulate interest among the laboring classes, the discrepancy between production and consumption shows little change. From a technical standpoint the French mining industry ranks very high; but the shortage of labor has made it impossible to work the mines to their full rated capacity.

American coal exporters will follow the fuel problem of France with keen interest. We know positively that French buyers have been investigating the prospects of contracting for a large tonnage of Illinois coal, and it is not unlikely that some Oklahoma fuels will find their way into the Italian markets during the coming summer. Foreign purchases in such remote inland markets have created an atmosphere of expectancy in trade circles.

Better Loading of Export Coal

One of the most serious objections raised to American coal in the export market is the careless and indifferent grading. In contradistinction to Great Britain and Germany, American operators have sacrificed everything to speed and economy in loading, and have then wondered why the American product could not compete successfully with the carefully sized coal from Europe.

In the new coal pier of the Baltimore & Ohio R.R., in Baltimore Harbor, it is encouraging to note that the constructors have taken cognizance of this important point. Special efforts have been made to reduce breakage to a minimum, and this is one of the first steps in this direction in this country. The pier will rank among the fastest in the country, having an annual capacity for 12,000,000 tons, or about 7000 tons per hour when working at full-rated capacity.

Counterweighted aprons are provided into which the railroad cars will dump, thus eliminating the heavy initial breakage of the first handling. A special device termed a "lowerator" has been installed for loading fancy grades of lump coal. This apparatus deposits the coal in the vessel, with a maximum drop of 3 ft.

This acknowledgment of one of the prime needs of our coal exporters is significant evidence of the increasing interest that is developing in the possibilities of our foreign coal trade. It will tend to stimulate interest among prospective exporters.

Effects of the Rail Congestion

Some illuminating evidence of the effects of the tremendous congestion in our transportation facilities is found in a review of the tonnage statements of the various carriers for last month. Of particular interest is the excellent statement of carload shipments issued by the Geological Survey, showing the movement of bituminous coal over 58 originating lines for February.

There being only 23 working days in February of this year as compared with 24 for the same month last year and 26 for January of the current year, the figures must be considered with caution. On the basis of the daily rate of production, however, the report points out that the figures are substantially less for February of this year than the other two months in all states except Kentucky and Alabama.

The daily average loading on 23 roads in the five leading Eastern coal states was 7 per cent. less in February than the preceding month, and on 13 roads west of the Mississippi the loss amounted to 19 per cent. This latter is readily accounted for by the greater hardships incident to the severe weather which marked the past winter. As to the former, it is gratifying that the loss is not greater, for seldom have reports indicated such a complete demoralization of transportation as during February.

Canada's Big Coal Year

It is well known that Canada was a big coal consumer last year, but many will be surprised to learn that the apparent consumption jumped from roughly 24 million tons to 30 million, making an extraordinary increase of 25 per cent. Of more significance to American producers is the fact that imports showed an increase of 41 per cent. in quantity and 35 per cent. in value over the 1915 totals.

Department of Human Interest

Compensation Here and Abroad

In the rapid spread of workmen's compensation legislation in this country the fact is often overlooked that many of the laws adopted are far less comprehensive than their mere titles would indicate. Because 35 states and territories, with some 75 per cent. of the employed population, have adopted such laws it is frequently assumed that a similar proportion of the wage workers of the country are now fully and properly insured against the loss and suffering of industrial accidents. That this is not true is emphasized in Bulletin 203 of the Bureau of Labor Statistics of the United States Department of Labor, entitled "Workmen's Compensation in the United States and Foreign Countries."

The bulletin presents a detailed comparison of the principal features of the various state compensation laws. The comparison brings out most striking differences, particularly as regards the proportion of workers covered and the scale of compensation benefits. No state compensation act covers all employees. In the first place most of the acts are elective. Employers who do not accept are penalized, but in spite of this there are always a number who refuse to elect. In the second place all of the acts purposely exclude certain classes of employees. Thus, agricultural workers, domestic servants and casual employees are almost everywhere excluded. Also there is an important group of acts which apply only to a list of employments declared to be especially hazardous, although in practice they may be no more hazardous than others not included. Again, a considerable number of acts apply only to employers having less than a certain number of employees, the minimum being in one case as high as eleven.

The result of these limitations and exclusions is to restrict the benefits of compensation very often to only a rather small fraction of the total number of workers. The bulletin makes a rough estimate of the proportion covered in each state, the estimate being based on the liberal assumption that election has been made by all employers affected in states having elective laws. In only two instances, New Jersey and Hawaii, do the acts include at best as many as 90 per cent. of the total workers and only seven states cover 80 per cent. or over. One covers less than 20 per cent. and nine less than 50 per cent.

In Oregon a Fatality May Cost the Operator $13,480

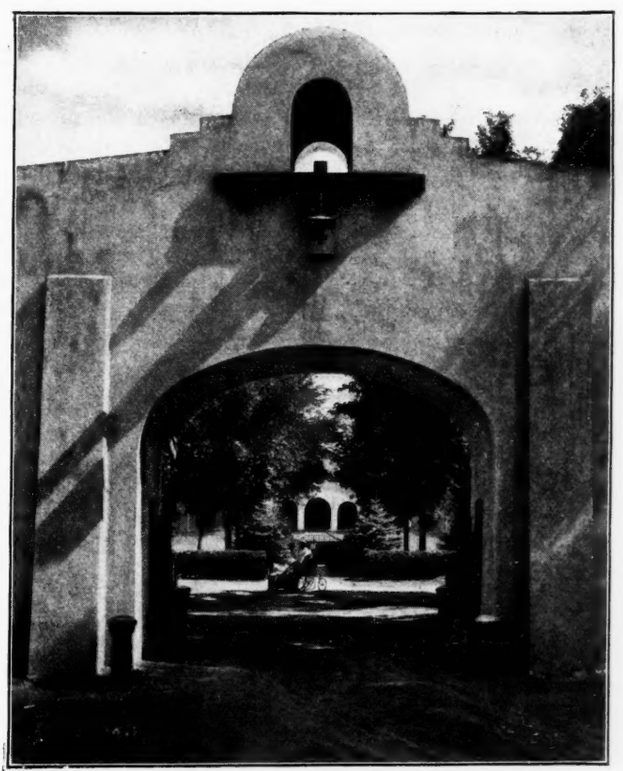
Similarly striking are the differences between the several acts as regards the benefits paid in case of injury. A few extreme instances may be cited. Thus, in the case of a fatal injury occurring in the State of Oregon the widow and children may receive in total as much as $13,480, whereas in Vermont the maximum would be $1830, and under the Oklahoma act no benefits at all are paid in case of death. For loss of a hand the Alaska act may pay as much as $2640, while the maximum for the same injury in Colorado is but $780. Again, in Oregon and Porto Rico cash benefits are paid for injuries of no matter how brief duration, whereas in Colorado no cash benefits are paid for disabilities of less than three weeks. Further, Washington and Wyoming, at one extreme, make no provision for medical service, this expense falling entirely on the worker; whereas, at the other extreme, several states, as Connecticut, Massachusetts and California, may pay for all necessary medical and hospital service, without limit as to time or amount.

The words "accident" and "injury" have different meanings in different places. Generally speaking, the practice has been to limit compensation to accidental injuries in the strict sense. There is a tendency, however, to broaden the term so as to take in the more subtle injury of occupational disease, such as lead poisoning, wood-alcohol blindness and anthrax. Massachusetts is the only state in which this has been regularly done with the approval of both the administering board and the courts. But the California act was recently amended so as to include occupational diseases and in certain other states the commissions have so interpreted the law only to be overruled by the courts.

It appears therefore that practically all the state compensation acts now in force need enlarging and liberalizing before they can be regarded as furnishing adequate protection to the whole body of wage earners. This, the bulletin points out, has been a general tendency of recent amendments. In no case has a compensation system once introduced been repealed. But in a number of instances inferior acts have been superseded by better ones, and in all cases where the courts have held particular acts unconstitutional the states affected have proceeded to enact new laws that would meet the necessary legal tests and, if no other way offered, the constitutions have been amended.

At the beginning of 1917 there were 35 compensation laws in effect in the United States, including those of Hawaii, Alaska and Porto Rico, but not including the new Federal act of 1916, which was not yet in operation, due to delay in the appointment and confirmation of the commission. Of the 17 noncompensation states, ten are in a single group of southern and south central states—Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Tennessee, Arkansas, and Missouri. The other seven are the two Dakotas; the three mountain states of Idaho, Utah and New Mexico; Delaware and the District of Columbia. In several of these investigating commissions are now at work and in some it is probable that compensation acts will be adopted at the current sessions of their legislatures.

In addition to reproducing in full the text of the American laws now in force the bulletin summarizes the important features of the laws of foreign countries. It also presents a comprehensive analysis of the decisions of the courts and of the various administrative commissions.



Courtesy of Colorado Fuel and Iron "Bulletin"

MINNEQUA HOSPITAL OF COLORADO FUEL AND IRON CO. SEEN THROUGH OPEN GATEWAY

H. C. Frick Coke Co. Equips New Mine-Rescue Station—The H. C. Frick Coke Co. has opened a new mine-rescue station at Leisenring No. 1 mine. A motor ambulance and a Ford truck with a pulmotor are stationed at that plant.

Donnelly Would Have Operators Use Motor Ambulances—A bill was introduced into the House of Representatives of Pennsylvania by Assemblyman James Donnelly, of Schuylkill County, requiring operators to furnish motor ambulances wherever mine ambulances are required. These are to be registered and licensed free by the state.

Discussion by Readers

Drawbar Pull vs. Track Resistance

Letter No. 2—The article "Drawbar Pull vs. Track Resistance" which appeared in *Coal Age*, Feb. 17, p. 331, interested me greatly, as I have recently completed dynamometer tests that show a track resistance of only 13 lb. per ton of load hauled. These tests were performed under mining conditions and were designed to show the great reduction in frictional resistance that is possible where the mine cars are equipped with roller bearings adapted to the severe conditions to which they are subjected in the mine.

The tests were performed on the outside tracks of the Coal Brook colliery, at Carbondale, Penn. Two trips of ten cars each were loaded so that the total weight was nearly the same in each case. The cars forming one of these trips were equipped with Hyatt flexible roller-bearing boxes, while those in the other trip had plain bearing boxes.

These trips were hauled, in turn, over the same track and at practically the same speed, and the average drawbar pull taken from a card on the dynamometer car, which was coupled between the trip and the locomotive, in each case. The results of the test showed that while the resistance in hauling the trip of cars with plain boxes was 32 lb. per ton of load hauled, it was only 13 lb. per ton when hauling the trip equipped with roller bearings.

This test, as well as a similar one previously made at Greensburg, Penn., proves that bearing friction plays a very important part in the drawbar pull of the locomotive. Instead of the track resistance varying from 20 to 40 lb., as often stated in mining practice, by the use of roller bearings this resistance can be reduced so as to run from 13 lb. up, depending on the bearing friction.

It is even possible to obtain a track resistance of "10 lb. per ton of load hauled," as stated in the inquiry on page 331, to which I have referred. Such a low track resistance, however, can only be obtained by the use of roller bearings, and these must be properly designed to meet the conditions with respect to dust and the rough handling incident to coal mining.

WALTER R. BYLUND,
Newark, N. J. Hyatt Roller Bearing Co.

Working 3-Ft. Pitching Coal

Letter No. 7—My experience is that more difficulties are encountered in the operation of a mine working low coal than is the case where the coal is of moderate thickness.

First, the height of the coal is an important factor in the economy of operation, for the reason that the brushing of the roof or the lifting of bottom on the roads, in order to secure the necessary headroom, adds greatly to the cost-sheet. The material must often be taken out of the mine as the available space for storing it is limited, except where the coal is worked on the longwall system and the material can be used for packwalls.

Second, the nature of the top and bottom is important, where there is any grading to be done to expedite the handling of the cars. My observation inclines me to think that thin coal seams will generally require more grading than where the coal is thicker.

Assuming a coal seam 3 ft. in thickness, having a hard floor and overlaid with 12 in. of drawslate that comes down easily, as suggested in the Foreword of Feb. 10, my plan would be to take down the drawslate in the headings and remove it to the most convenient place where it can be stowed away. In my experience it has been more economical to take down the drawslate after each cut made in the coal. When this is not done, it is generally necessary to post the slate or support it with crossbars, which increases the expense for labor and material.

Taking down the drawslate at the face, following each cut of coal, not only eliminates the expense of timbering but gives more headroom where the miner must work and enables him to load his coal to greater advantage with less trouble. The miner is able to load more coal in less time, thereby increasing his daily output; and there are no timbers to be blown out in shooting the coal.

I very much prefer a low, wide car to one that is higher or longer. In the working of low coal I would suggest a car having a capacity of 28 or 30 bu., or say one long ton (2240 lb.). I have found that cars of this capacity fill the requirements in low coal better than cars of greater capacity.

A wide car is better than one that is longer and narrower, since the latter is inconvenient to load. More energy is required to throw the coal to the head end of the car than the ordinary miner possesses. I prefer a track gage of 42 in., as I believe this gives better results and is well adapted to cars of this size.

Uniontown, Penn. JOHN T. BRADLEY.

Letter No. 8—As an engineer and superintendent of mines I have had some experience in working coal under conditions similar to those described by Samuel Dean, in his article, *Coal Age*, Feb. 10, p. 260. In working this coal, I would use the room-and-pillar system, dropping the drawslate so as to give the necessary headroom on the roads and in the rooms.

I would use a low car having a capacity of about 2 tons. The car should be 7 ft. long and 4 ft. wide, inside dimensions, the bed of the car expanding over the wheels to provide a greater capacity. [See illustration, p. 488, last issue.]

I prefer a car body of steel but having a wooden bottom, believing that this makes a most suitable car for durability and for handling in the mine. The track gage, for this size of car, should be 42 in. I would use 12-in. wheels and a wheel base of 20 or 22 in. I have found the Hyatt roller-bearing wheels give good satisfaction and greatly assist the handling and haulage of the loaded cars.

The mine should be equipped with electric coal-cutters and locomotives. In order to avoid the danger of igniting the gas generated in the mine, it would be necessary to in-

stall a good system of ventilation that will make the mine safe in this respect.

In my opinion, the best type of machine to use, in this case, is the Sullivan CE-7 shortwall machine, having a 7½-ft. cutter-bar. This machine should be driven by electricity, as I believe electric power to be far superior, in the results attained, to what is realized in the use of compressed air.

The main roads should be driven practically on the strike of the seam, having sufficient grade toward the shaft to give good drainage and assist the movement of the loaded cars. At the foot of the shaft a haulage engine should be located in line with a pair of headings driven straight up the pitch.

An engine-plane haulage should then be installed on these headings for the purpose of raising and lowering the cars from the flats or levels to the shaft bottom. A tail-sheave must be located at the head of the incline. In one of these headings track is laid for the cars and the rope passes from the engine up the parallel heading to the headsheaves at the face of the pitch, the end of the rope being then attached to the cars to be lowered.

I would use 60-lb. steel on the main road and 40-lb. steel on all flats, while 25-lb. steel could be used in the rooms. I would use good 5 x 6-in. ties, 5½ ft. long, and 4 x ½-in. railroad spikes on all 40-lb. and 60-lb. steel. For the 25-lb. steel, lighter 4 x 5-in. ties, 5 ft. long, and 3 x ⅜-in. spikes can be used. Automatic switches should be laid on all roads.

Using a shortwall machine having a 7½-ft. cutter-bar, the coal on each flat should be worked out by driving 14-ft. openings up the pitch, with 14-ft. pillars between them. This will provide two slab cuts, in driving up the rooms or stalls and drawing back the pillars. The flats should be driven on 100-ft. centers, and care should be taken not to open up too much territory at one time.

Smock, Penn. T. W. ENGLISH.

Textbooks in Examination

Letter No. 21—I have been pleased to note the interest manifested by some of our most capable mining men, in the question of permitting candidates to use the textbooks with which they are or should be familiar, when taking the examination for a certificate of competency to act as mine foreman. In writing my first letter, which started this discussion, I fully realized that there were two sides to this question, and the opinions expressed by different writers who have entered the discussion fully bear out my expectation.

The discussion has developed a variety of opinions. It has been claimed by some and denied by others that such a practice would lower the standard of the examination. The objection has been made that candidates could copy their answers from similar questions found in the textbooks from which, as one has suggested, examining boards largely take their questions. I wonder if this reflects on the examining boards guilty of so doing.

One writer fears that too many men would pass the examination and there would be many applicants for the position and the wages of competent men lowered thereby. Some have even gone so far as to say that technical questions should not be asked in the examination of candidates for a mine foreman's certificate, but that the questions should be wholly those of a practical nature.

These opinions must be accepted for what they are worth, but I am glad to observe that some of our best men have given it as their opinion that the candidate in examination should be placed as nearly as possible under the same conditions with which he is surrounded in practice.

Mine Inspector Cunningham well remarks in his letter, Dec. 23, p. 1058:

> By denying a candidate the practical aids to which he has always had access in his daily work, an examining board places itself in the position of testing a candidate's ability to memorize formulas and constants required in his work. It goes without saying that this test of memory has no relation to the candidate's fitness for the position he seeks and should be entirely eliminated from every practical examination.

What I most desire is to impress the idea that mine foremen should study the theory and principles of mining. A man may be a good practical miner and fully capable of taking charge of mining work, but it cannot be denied that he would be a better and more efficient official if he understood the theory and principles of mining.

For myself, I have greatly felt the need of a better education; but it has always been my endeavor to understand the reason of things, and I believe that a knowledge of first principles is the chief factor that makes for the safe and economical operation of a mine. I feel that this discussion has done much good. THOMAS HOGARTH.

Heilwood, Penn.

Letter No. 22—The examination of candidates for the position of mine foreman, assistant foreman and fireboss is a most important work. The responsibilities resting on each member of an examining board are as great or greater than those resting on the mine foreman having charge of a large mine and responsible for many lives.

It is not always the case that men constituting a board of examiners realize fully the duties of their position and have a clear understanding of what is required to qualify the man for the position he desires.

The strongest argument presented in this discussion is the contention that the aim of the examination should not be to tax a man's memory, but that he should be allowed to work under the same conditions with which he is surrounded in his daily practice.

The examination is not a memory test, but must show whether or not the candidate would be capable of handling any problem that might arise in ordinary mining practice, by any means at his disposal when acting in an official capacity.

WHAT DETERMINES A MINE OFFICIAL'S CAPABILITY

A man's practical capability is not determined by the rules, formulas and figures he can carry in his head, but rather by his knowing where to find and how to apply these in order to get results. There are things a mine foreman must remember, but they are not the formulas and data necessary to answer technical questions.

In deciding upon a candidate's fitness and competency to fill an official position in the mine, an examining board must pass on four elements that are essential to efficiency; namely, (1) character, (2) experience, (3) knowledge and (4) acumen.

1. A candidate's character is largely determined from his credentials and reputation as being a sober, honest, industrious man, of good judgment and kind and firm in his decisions and treatment of men.

2. His experience is determined by his record in mining work, the length and kind of service he has performed and his previous success in conducting work and handling men.

3. The written examination must determine both the candidate's practical and technical knowledge of mining. It should include both practical and technical questions relating to the operation of a mine and covering the different problems that arise in ordinary mining practice and with which a foreman must contend.

The Written Examination Should Be Divided

This naturally divides this examination into one or more sessions wholly devoted to the answering of practical questions, and one or more sessions devoted to technical questions. Both of these should be written examinations: the former without books and the latter with any books, data, or other aids to which a man would have free access in his daily practice in the mine, the office or at home.

The first sessions are to show the man's knowledge and judgment in the face of various conditions common to mining, his knowledge of the mining law and the safe operation of mines, the behavior and handling of mine gases, timbering of working places, mining and blasting of coal and rock, methods of working under different conditions of roof and floor, systems of hauling, draining, signaling and lighting, etc.

Technical questions relating to mine ventilation, pumping, hauling, timbering, etc., should be confined to the later sessions in which the candidate should be permitted the free use of any textbooks he chooses to bring to the examination room.

Aim of the Oral Examination

4. The oral examination should be largely devoted to ascertain a candidate's acumen or quickness to grasp and act in any situation or emergency that may arise in the mine. This is an important feature of every oral examination.

The man who is slow to grasp a situation and decide upon the best means to adopt, or method to pursue, in handling a dangerous matter is not equal to many emergencies that may arise in his mining practice. A few such instances are, for example, fire on the intake airway, a sudden outburst of gas, the rescue of a man caught by a fall of roof or coal, and other like situations that require quick, intelligent action on the part of the man in charge.

Textbooks in Examination

I am fully aware that the use of textbooks may seem to many as being ill-advised. It must be remembered, however, that the purpose of a practical examination is to give the candidate every advantage that he would have in the prosecution of his daily work. If he knows how to use these aids in the examination, it is clear that he will be able to make the same use of them with the same success in daily practice.

I have no apology to make in offering this suggestion to examining boards. It is reasonable and is growing rapidly in favor, displacing the old idea that a man's ability to perform is measured by the amount of matter he can carry in his head.

It may surprise some to know that the students in many of our highest institutions of learning are permitted to bring to their examinations as many of their textbooks and other data as they choose and to refer to them as often as desired while taking the examination.

The aim of most examinations is to show a man's ability to find and apply the data required for the proper performance of the work he is expected to undertake. In practice, men of all callings and professions, including engineers, lawyers, doctors, and others, all refer to their books for the information they require, and mining is no exception to this rule.

Dr. Charles Edward Lucke, an eminent authority and professor of mechanical engineering, of Columbia University, advises his students to bring any textbooks and other data they choose to the examination. More questions are given than the students are expected to answer in the time allotted them.

The grade, in such an examination, is based on the quality of work done and not alone on the quantity or number of questions answered. In one case, in one of Dr. Lucke's examinations, a student received a mark of 100 per cent. and only answered six out of the ten questions asked. It was not uncommon for a student to bring a small library of books to the classroom and refer to them during examination.

Capable Men Know Where To Find Needed Data

In closing, let me urge that the main point that determines a practical man's capability is his knowing where to find and how to apply the data required in the work he is to undertake.

It may be of interest, in this connection, to draw attention to a general letter that I prepared and sent to all examining boards in the different coal-mining states, in June, 1906. This letter and extracts from the replies received from board members were published in "Mines and Minerals," Vol. 27, p. 165.

It is earnestly hoped that the present discussion, in *Coal Age*, will have the effect to largely extend the use of textbooks in examination and give candidates the same privileges that are theirs in practice.

New York City. J. T. Beard.

[This closes the discussion of "Textbooks in Examination." Of twenty contributors, exclusive of the last two letters, ten favor the use of textbooks in a practical examination, while nine oppose the practice and one is indifferent.—Editor.]

Cleaning Up a Roof Fall

Letter No. 13—The placing of the blame for an accident to a timberman engaged in cleaning up a roof fall will depend largely on the experience of the timberman. The law requires that when any danger has been discovered in the mine, the mine examiner or fireboss who discovers the danger shall examine the place carefully to ascertain its condition and then place danger signals to warn everybody to keep away.

Having done this, it is that official's duty to note the danger in his report and inform the mine foreman, who must attend promptly to its removal. The foreman must employ practical experienced miners for this work and give them all necessary instructions in regard to taking down the loose rock and removing the fallen material.

Because the timberman sent to perform the work is an experienced man does not excuse the foreman if he fails to give the necessary instructions to the man how to proceed. Then, if the timberman fails to carry out the in-

structions of the foreman, he alone is to blame for any accident that may result from his disobedience.

Where an assistant foreman is employed, it is my opinion that he should hold a mine foreman's certificate and possess as much knowledge of the mine and its operation as the foreman himself and, moreover, be thoroughly acquainted with the mining law. When the assistant foreman sends men to perform certain work and neglects to give them the necessary instructions to insure their safety, he is responsible for any accident that may occur.

In almost every mine there are many miners who feel that they can take care of themselves without receiving instructions from anyone. Timbermen are no exception to this rule, and it has been generally accepted that a mine foreman needs only to tell an experienced timberman to clean up a fall, and that he need give him no further instructions in regard to making himself safe. In my opinion this is a bad practice. The most experienced men should be willing to listen to the instructions given them in regard to a piece of work they are to perform. Fewer accidents of this nature would then happen.

Walsenburg, Colo. ROBERT A. MARSHALL.

Bruceton Test of Clearfield Dust

Letter No. 3—In his article, "Explosive Combustion of Dust," *Coal Age,* Dec. 23, p. 1057, John Verner discusses at some length the Bruceton test, or rather the benefits to be derived from it by the coal-mining interests. Without an explanation of the difference between the conditions of the test and those existing in the Clearfield mines, Mr. Verner regards it of "no practical value."

Criticizing this view of Mr. Verner, Sim C. Reynolds says, *Coal Age,* Mar. 3, p. 405, "This would naturally be taken to mean that the bureau engineers should explain what is already known to every mine official, mine owner and miner; namely, that practically all bituminous coal dust is explosive under certain conditions and quite as certainly nonexplosive under other conditions."

I am inclined to agree with Mr. Verner in his contention that the difference in conditions should be fully explained to show the true application of the test to the Clearfield mines. To prove that the dust from the Clearfield mines will explode under certain conditions prepared to produce an explosion at Bruceton, does not clearly prove to my mind that it will explode under the conditions existing in the mine from which it was obtained. Like Mr. Verner, I consider that test as having little if any practical value so far as the general mining interest is concerned.

In my opinion, in order to be of practical value, the Bruceton test should have been made in a manner to ascertain whether the dust taken from the Clearfield mines was a dangerous factor in those mines or explosive under the conditions existing therein. I feel confident that had it been possible to have made such a test at the Clearfield mines, under the conditions that prevail there, the results would have been quite different. I fail now to understand how the present test is to have any value to the coal industry of the country or be satisfactory to those operating in that particular district. We are more interested in knowing under what conditions and to what extent coal dust is dangerous and a menace to safety in the mine where it is found than to know that it can be made explosive under conditions confessedly different from those prevailing in the mine where it was obtained.

One writer has asked whether such conditions as prevailed at the Bruceton mine at the time the test was made actually exist in the Clearfield mines. I will extend this inquiry farther by asking, Is it at all probable or possible that such conditions will ever exist there?

The Bruceton experiment teaches us, however, that the presence of dust in any mine is more or less of a menace to safety and when found under certain conditions is more dangerous than when found under other conditions entirely different. Then, since the explosibility of dust depends largely upon the existing conditions, as shown by the Bruceton test, we must conclude that it is more the prevailing conditions that are to be feared, and in order to lessen the number of dust explosions these conditions must be changed.

If the enginers of the Bureau of Mines content themselves only with telling us that dust from certain mines proves explosive under conditions prepared in the Bruceton mine, and make no effort to ascertain whether it is explosive under the conditions existing in the mine from which it was taken, wherein, let me ask, will the mining interest be benefited in a practical way by such information? JOHN ROSE,

Dayton, Tenn. Former District Mine Inspector.

Mine-Accident Record

Letter No. 15—Early in the morning, Wednesday, Feb. 7, 1917, a fire started in a blind heading at the foot of No. 1 shaft of the Auchincloss colliery. It proved a most stubborn fire to fight, requiring the assistance of the helmet men in the employ of the company. The fire started at 1:30 a.m., when, fortunately, there were but few men in the mine. It was practically a shaft fire, since the heading was so close to the bottom of the shaft that the latter was in great danger.

Although this opening was the downcast, and an air volume of 200,000 cu.ft. per min. was passing down the shaft, this did not prevent the dense volumes of smoke that issued from the fire backing up 250 ft. in the shaft, besides being carried by the air current into the mine. The shaft is 1715 ft. deep. It was sunk in 1893 and timbered from the top to the bottom with hemlock timber.

There is hardly a question that this fire was the direct result of gross carelessness on the part of the men employed in repairing the shaft. For the past 16 years, much labor and material have been expended in keeping the shaft in repair, which has required the work of from four to six men every night in the month.

The reason for this great outlay for repairs will be better appreciated when it is known that in the sinking of the shaft it was the chief aim of the sinkers to see which of the three shifts employed could send up the greatest number of buckets in the 8 hours of their shift. As a consequence, the holes for blasting out the material were placed so close to the rib line that the solid wall of the shaft was much fractured and blown out so as to form great pockets in the rock back of the shaft curbing. This condition produced a weak wall that was constantly crumbling. Much expense for repairs would have been saved had more care been observed in blasting the excavation and filling the space behind the curbing with suitable material.

But to return to the accident. During the past three months the shaft men have been taking short planks 4 ft. long and 10 and 12 in. wide down the shaft every

night. They used the blind entry as a storage place for their tools and timber. It was in this place, where much combustible material had accumulated, that the fire started. At the present time, however, no one is able to say just what was the direct cause. The timber taken down the shaft and stored in the blind entry was Southern pine.

Although this mine was worked exclusively with locked safety lamps, it had been the custom of the shaft men to use large flaming torches on their heads when at work in the shaft. It seems only reasonable to suppose that the use of these torches was responsible for the starting of the fire. As previously stated, the smoke backed up the shaft 250 ft. against the air and crossed over to No. 2 shaft, where a man was at work who immediately gave the alarm.

In order to reach the seat of the fire in No. 1 shaft, it was necessary to deflect the air current of 200,000 cu.ft. in No. 2 shaft down the "George-vein manway" to No. 1, thereby increasing the volume of air in No. 1 shaft to 400,000 cu.ft. per min. and enabling the men to attack the fire in the heading. The story of this accident should impress on the minds of all mine workers the need of more care in their work. W. A. BARRETT.

Nanticoke, Penn.

After the Accident

Letter No. 1—Certainly, W. L. Morgan has set forth some striking facts on the carelessness of miners who neglect to use safety-first precautions in their work in the mine, *Coal Age*, Jan. 27, p. 203. He draws attention, also, in a forcible manner to the criminal mismanagement of mine officials who do not give careful consideration to dangers that they know exist in the mines in their charge.

The mine foreman who, he says, neglected to examine the report of the fireboss was criminally responsible for permitting the miner to go to work in his place before seeing that the gas was removed. Also, the fireboss who neglected to take the miner's check from the board, after finding gas in his place the second day, was criminally responsible and showed great lack of judgment.

Both of these men should be prosecuted for their neglect. Instead of ties placed across the tracks, proper danger signals approved by the Department of Mines should have been used. Such signs should be provided by the mine foreman and used by the fireboss whenever he finds gas or other danger in a place. The miner's check should then be taken from the board so as to prevent his going to work as usual.

Much has been done to avoid accidents that occur through the carelessness or neglect of mine officials and the reckless disregard of danger, on the part of the miner; but accidents still continue to occur. What is required now is greater discipline in the mines. It is true that many miners take chances, in the face of dangers, that men less acquainted with underground conditions would not think of taking.

Mention was made in the same letter, to which I have referred, of a carbide lamp dropping from the head of a miner and falling into his cap holding the powder with which he was making up his cartridges. The statement is made that "Being a carbide light, no spark dropped into the powder."

The fact seems to be overlooked that fine dust often cokes on the tip of the burner of a carbide lamp, and there is nothing to prevent a glowing bit of coked dust falling from a carbide light when a miner makes up his cartridge with such a lamp on his head. The only safe plan is to put the light where it can do no harm.

———, Penn. THILMOND.

Letter No. 2—I am a fireboss, and the reading of the many mine accidents recorded in *Coal Age* makes me think what some men will risk for the sake of a few dollars, trying to accomplish two hours' work in one.

The many accidents recorded in regard to blasting would not occur if shotfirers would take more time to examine the shots they must fire. If they would go into the mine before quitting time and go around their district while the men are preparing their shots they would find a number that do not comply with the requirements of the mining law and are unsafe to fire.

Many accidents would be saved, also, if the companies employed a competent man to examine all shotholes and determine the quantity of powder that must be used in each hole. In my opinion, the shots should be prepared by the shotfirer himself, who should examine and charge the hole and tamp and fire the shot. He would then know whether the shot was safe to fire.

A good suggestion was made by Fred B. Hicks, in his letter, *Coal Age*, Feb. 24, p. 368, in regard to enforcing more discipline in the mine. Mr. Hicks says, "Foremen should visit working places at unexpected times, and when men are found working contrary to rules and instructions they should be laid off or penalized in a way that they will remember."

ENFORCE DISCIPLINE BY FINES FOR DISOBEDIENCE

I want to suggest that any shot that is found not to conform to the rules and regulations of the mine should be marked by the examiner in such a way as to denote that it is illegal. The man who prepared the shot should be fined $1 for the first offense, and if it is repeated he should be promptly discharged. As Mr. Hicks remarks, "A few acts of discipline along this line would soon bring men to terms who are now prone to disregard instructions and run their own chances of safety."

I am heartily in favor of what has been said in regard to limiting the amount of powder that each man is permitted to take into the mine. Many miners think that the more powder they put into the hole the more coal will be blown down and ready for them to load the next day. The risk to the shotfirer or the damage to the mine that may result does not appear to enter their minds.

If there was greater coöperation between the operators, mine inspectors and miners, and the mine inspectors would make more frequent visits and take greater pains to impress upon the miners that any violation of the law will meet with prompt action, the effect would be to make them more careful and they would take fewer risks.

Only recently I have learned that seven men were prosecuted and fined a total sum of $9.80 for violations of the law, following the explosion that occurred at No. 3 Crown Hill mine, Dec. 9, 1916, to which I referred in a previous letter, *Coal Age*, Jan. 6, p. 30.

I understand this action took place a few days after the explosion occurred. If greater publicity was given such prosecutions, as well as the inquests held on mine accidents, and the details of these occurrences given, I believe it would lessen such accidents in mines.

Clinton, Ind. TIM GOLDON.

Inquiries of General Interest

Maximum Explosive Point of Firedamp

Kindly explain how the maximum explosive point of a pure firedamp mixture is calculated. Also state how the lower and higher explosive limits of firedamp are determined and what is the effect of fine coal dust floating in the air or of blackdamp on the explosive range.

Smithdale, Penn. HARRY JONES.

The maximum explosive point of a pure firedamp mixture consisting of methane or marsh gas (CH_4) and air occurs when there is just enough oxygen in the air to completely consume the carbon and hydrogen of the gas. The reaction that takes place is expressed by the following equation:

$$CH_4 + 2O_2 + 8N_2 = CO_2 + 2H_2O + 8N_2$$

This equation shows that two molecules of oxygen are required to satisfy one molecule of methane, and since these gaseous molecules are of the same size, one volume of methane requires two volumes of oxygen for its complete combustion.

But oxygen forms 20.9 per cent. of normal air, and two volumes of oxygen, therefore, represent $2 \div 0.209 = 9.57$ volumes of air. The firedamp mixture then contains one volume of gas and 9.57 volumes of air, or 10.57 volumes in all, and the percentage of gas is, therefore, $(1 \div 10.57)\ 100 = 9.46$ per cent.

The lower and higher explosive limits of pure firedamp have been determined by many careful experiments and are commonly stated as follows:

Lower limit,	1 vol. gas : 13 vol. air.....	7.14 per cent. gas
Higher limit,	1 vol. gas : 5 vol. air.....	16.67 per cent. gas

Fine coal dust floating in the air charged with gas has the effect of widening the explosive range of firedamp. In other words, the dust being burned by the flame of the explosion is converted into carbon monoxide, which is highly inflammable, and firedamp mixtures that are only inflammable but not explosive are rendered explosive by the heat of the combustion of the carbon monoxide from the dust.

The presence of blackdamp or any extinctive gas, on the other hand, absorbs heat from the burning firedamp and reduces the rapidity of the combustion, to that extent destroying the explosion. The effect is to lessen the explosive range of firedamp.

Reopening a Flooded Mine

We have in contemplation the reopening of a shaft mine that was formerly worked by the longwall method. The seam is practically level, the coal being 3 ft. thick and lying at a depth of 1200 ft. below the surface. At the present time the shaft and mine are standing full of water. The extent of the worked-out area is about 100 acres. Will you kindly submit the following questions to the readers of *Coal Age* for their practical suggestions as to the best means to employ to unwater this mine:

1. Assuming that the natural inflow of water into the mine is 200 gal. per min., what system or method would you suggest to drain this mine in the easiest and quickest way, at the least expenditure for equipment and operation?

2. After the water is all out of the mine, what permanent system of pumping will prove most efficient and economical in handling an inflow of 200 gal. of water per min., under a discharge head of 1200 ft.?

3. What should be the capacity of the sump required to meet this demand?

The roof and floor of this seam is sand rock and the longwall system of mining formerly employed proved expensive, because the face caved in regularly, about every 60 ft. of advance. In order to obtain the material required for the packwalls, it was necessary to do much brushing in the rooms. These conditions, together with the fact that our miners lack longwall experience, seem to make it advisable that we adopt some other system of mining.

Assuming that the mine has been unwatered successfully, allow me to submit a few additional questions to the experienced readers of *Coal Age:*

4. Taking everything into consideration, what would be the safest, most practicable and the most profitable method of working to employ in operating this mine?

5. Give size of panels, distance apart of butt headings or cross-entries, width of rooms and pillars, size of main and cross-entries and width of entry pillars, etc.

6. Should this coal be mined by machines, and, if so, what type of machine should be used?

7. Give a fair estimate of what tonnage may reasonably be expected, within six months after the mine has been unwatered and operations commenced at the face.

8. Show by sketch the method proposed of starting a room-and-pillar or other system off the longwall face.

These questions have undoubtedly presented themselves to many practical coal-mining men, and their experience cannot but be interesting and valuable to others who are facing a similar proposition. I hope to see these two phases of reopening a flooded mine thoroughly discussed in *Coal Age*. C. KING MORELIGHT.

———, Okla.

Coal Age gladly submits these questions to its practical readers for discussion. Only recently a similar proposition was discussed with great interest, and much benefit was derived from the various suggestions offered and opinions expressed. The questions propounded here present a wide field for discussion.

Contributors should always take care to make their meaning clear. When describing methods of working it is generally better to draw a rough pencil sketch to illustrate the proposed plan. It is also important to write plainly on one side of the paper only and leave space between the lines. All contributions must bear the name and address of the writer, which will not be published if so requested when the article is sent.

Examination Questions

Wyoming Mine Foremen Examinations Held at Different Places—1917

(Selected Questions)

Ques.—Explain fully the construction of the Davy and Wolf lamps, and state the essential difference between these two types of safety lamps.

Ans.—The Davy lamp consists of an oil vessel surmounted by a gauze chimney having a diameter of practically 1½ in. and a height varying from 4 in. in the pocket fireboss Davy to 5 and even 6 in. in some of the old-style lamps. The lamp is usually provided with a shield to protect it against a sudden rush of air or strong air currents. The shield also serves as a good background against which to observe the flame cap. The Davy lamp is designed to burn ordinary lard, sperm or cottonseed oil and has a free circulation of air that insures a correct test of the atmosphere immediately surrounding the lamps, as the space within the gauze chimney is kept clear of burnt air and gases.

The Wolf lamp consists of a pressed-steel oil vessel filled with absorbent cotton, which is designed to absorb the volatile oil burned in the lamp and render it less liable to explosion. The oil vessel is surmounted by a glass chimney, beneath which is a gauze ring with openings for the admission of air below the flame. The glass again is surmounted by a gauze chimney that may be single or double, as desired. The gauze chimney is surrounded by a corrugated metal bonnet provided with tangential openings that permit the passage of air in and out of the lamp.

The essential difference between these two types of lamps is: First, the chimney surmounting the oil vessel in the Davy lamp is wholly gauze, while in the Wolf lamp it is both glass and gauze. The former construction gives a free circulation of air that insures a like gaseous condition of the air within the chimney as that surrounding the lamp.

The glass of the Wolf lamp permits a better light, but the test for gas with this lamp is not as reliable as with the Davy, inasmuch as the air in the combustion chamber of the Wolf is more or less contaminated with burnt air and gases, besides being slightly impregnated with the volatile oil vaporized from the wick.

Second, the volatile oil burned in the Wolf lamp, while giving a brighter light, is a dangerous oil to handle and is not so reliable, as an accurate means of testing the gaseous condition of the mine air, as the nonvolatile oil burned in the Davy.

Ques.—How would you carry your safety lamp when entering a known dangerous place in the mine?

Ans.—Such a place must be entered with caution. No quick movement must be made that would disturb the gas and possibly envelop the observer in a dangerous atmosphere. The lamp should be held upright in the right hand and slowly elevated toward the roof, while using the left hand as a screen for the eyes, which will enable the flame cap to be more readily perceived. The test for gas must be made at short intervals to avoid walking into a body of gas from which it would be difficult to escape.

This answer assumes that the place is dangerous because of an accumulation of a firedamp mixture. The place may, however, be dangerous from an accumulation of carbon monoxide, which is best detected by observing the effect of the gas on small animals as birds or mice contained in a cage. Or, the place may be dangerous from the accumulation of blackdamp, which must be detected by its effect on the lamp, causing it to burn dimly. Caution must be observed in any case.

Ques.—Do changes of atmospheric pressure affect the gases given off in a mine?

Ans.—A change in barometric pressure has a practically inappreciable effect, if any, on the emission of gas from the strata. A sudden fall of barometric pressure, however, has a very decided effect on the gases confined in abandoned places, cavities in the roof, or in the interstratified spaces often formed by the settlement of a drawslate away from the overlying formation. Under the decreased pressure of the atmosphere, the gas confined in these spaces expands rapidly into the mine and may render the mine atmosphere dangerous in poorly ventilated places.

Ques.—What percentage of firedamp, when mixed with air, is necessary to show a faint cap?

Ans.—This question should read, What percentage of marsh gas mixed with air, etc. The observing of a cap depends not only on the percentage of gas present in the air, but likewise on the kind of lamp used, the oil burned and the ability of the observer to perceive the cap formed on the flame. Also, the presence of but a comparatively small proportion of blackdamp in the air will decrease, while fine coal dust floating in the air will increase the size of cap that would otherwise be formed.

Assuming a pure firedamp mixture, however, when using an unbonneted Davy lamp burning cottonseed oil, a good observer can detect the first appearance of a cap in air containing 2 per cent. of marsh gas. Again, using a lamp burning a volatile oil, or hydrogen gas, it is possible to detect a cap when only 1 per cent. of gas is present.

Ques.—What percentage of marsh gas mixed with air marks the lower explosive limit of the mixture; and what percentage of gas is present when the firedamp reaches its maximum explosive point; also, give the percentage of gas present at the higher explosive limit.

Ans.—A mixture of pure marsh gas and air first becomes explosive when it contains 1 volume of gas to 13 volumes of air. This is called the "lower explosive limit" and the firedamp then contains 7.14 per cent. of gas.

The maximum explosive point of pure firedamp is reached when the proportion of gas to air is 1:9.57, the firedamp mixture then containing 9.46 per cent. of gas.

The higher explosive limit of a pure firedamp mixture is reached when the proportion of gas to air is 1:5, the mixture then containing 16.67 per cent. of gas.

Coal and Coke News

Washington, D. C.

A complaint has been filed with the Interstate Commerce Commission by the Ohio Valley Coal Operators Association petitioning for a revision of the coal rates from the west Kentucky coal field to the consuming territories. The Illinois Central and many other railroads were named defendants. It was pointed out that the principal competitor of the west Kentucky coal field is the southern Illinois coal field. These two fields being closely related geologically, it was pointed out that the physical conditions in the southern Illinois field with respect to thickness of workable bed and absence of pitching seams are superior to the conditions that exist in the west Kentucky field. The complainants alleged that a serious discrimination in rates exists in favor of the Illinois miners.

It was stated that "Chicago, Ill., is the largest market for bituminous coal in the United States and, although the average distance from the west Kentucky coal field to Chicago is less than 400 mi., the defendants refuse to accord to said west Kentucky field rates that will enable it to reach the Chicago market under normal conditions." A similar claim was made in respect to the rates on coal from this field to Louisville, Ky., and Memphis, Tenn., and to sundry other territories.

The complaint further stated: "That the southern Illinois field is also served, in part, by the defendants, Illinois Central and Louisville & Nashville; that the rates now maintained by defendants to the South and to the Southwest from said southern Illinois field are, generally, the same as, or lower, than the rates from the west Kentucky field; that the defendant, Illinois Central, maintains a full line of through rates and through routes from both fields to the South and to the Southwest which are the same from both fields to the South but which are, to certain territory in the Southwest, lower, from its southern Illinois field than from its west Kentucky field; that the defendant, Louisville & Nashville, maintains no through rates from its southern Illinois field to Southern points east of the Mississippi River that are, generally, lower than those few through rates maintained from its west Kentucky field; that to the North and to the Northwest defendant, Illinois Central, maintains a full line of through rates and through routes from its southern Illinois field but maintains only a limited number of through rates and through routes to said territory from its west Kentucky field and such through rates as are maintained from its west Kentucky field to the said North and Northwest range from 15c. to $1.35 per net ton higher than the through rates contemporaneously maintained from its southern Illinois field." Similarly discriminations are practiced against the west Kentucky field to other consuming points. In conclusion the complainants alleged:

"That although the west Kentucky coal field is located in the heart of a large coal-consuming territory; it can now reach, under normal conditions, practically none of the said consuming territory and its failure to reach same is due to the unjust, unreasonable and unduly discriminatory rate adjustment described herein; that it is now largely confined to selling its coal to Memphis, Tenn., and Louisville, Ky., at which points it is unable to market anything like its reasonable output and where it meets the most intense competition; that as a result, the coal operators in the said west Kentucky field have been compelled to sell an unduly large per cent. of their production to the defendant, Illinois Central, and to the defendant, Louisville & Nashville, for use by said defendants as engine fuel and, that by reason of the aforesaid restricted market, said coal operators in the said west Kentucky field have been compelled to sell coal to said defendants at a price much less than they could have obtained had they enjoyed just, reasonable and nondiscriminatory rates to the surrounding consuming territory; that by reason of all of the foregoing the output of the west Kentucky coal field has been greatly restricted, many of the operators have failed and abandoned their mines and none of the operators have been able to earn, during normal times, a reasonable return on their property; that in abnormal times such as have existed during the past winter, the public, in territory contiguous to the west Kentucky coal field, suffers, by reason of inability to get sufficient coal, and is prevented from obtaining coal from the said west Kentucky coal field by reason of the fact that there are no lawfully established through rates."

A complaint was also filed by the Southern Coal, Coke and Mining Co. against the Southern and the Illinois Central railroads. This company mines coal in the Belleville District of Illinois. The complainant requested the Interstate Commerce Commission to direct the railroads to establish rates from this district to destinations on the Illinois Central in Iowa, Wisconsin, Minnesota and South Dakota, which shall not exceed an amount which is 10c. per ton less than the rates contemporaneously in effect from the mines in the southern Illinois group to the same destinations.

The Federal Trade Commission has sent the following letter to about 25 of the largest anthracite coal producing companies. The letter points out that any indirect increase in spring prices of hard coal by omitting the customary reductions in price at that season of the year could not be justified on the basis of the figures of cost of production compiled by the Commission.

"It is rumored in the anthracite trade that the producting companies are intending either to withdraw or reduce the spring discounts this year, thus increasing the prices charged for anthracite coal. None of the large railroad coal companies has as yet announced its policy. The selling agent of one of the more prominent of the independent operators, however, has made the following announcement to the trade:

'Owing to a number of circumstances which have increased the cost of mining coal, we do not intend to make the usual spring reduction on anthracite.'

In its inquiry into the cost of mining anthracite, the report on which will be issued in the near future, the Federal Trade Commission has obtained detailed information on the cost of companies which mined in 1916 about 75 per cent. of the total production of anthracite. This information, obtained directly from the records of the companies referred to, indicates no increase in average cost in the last four months of 1916, and further indicates an actual decrease of cost in the case of some of the companies whose costs of production are high. Judging from the tonnage produced in January, 1917, there is no reason to believe that costs thus far this year would materially change the average shown by the figures compiled for September to December, 1916. Therefore it is the opinion of the Commission that further increase in circular prices this spring by failure to grant the customary discounts could not be justified on the basis of increased cost. The Commission makes this statement in advance of its forthcoming report, because it is a matter of vital interest to the public that no unjustifiable increase of price should be made.

This statement does not refer to the increases in circular prices of all anthracite in May, 1916, nor to the panic prices which have prevailed on part of the tonnage this fall and winter, concerning which the Commission will make a report in the near future. The cost data already compiled by the Commission, however, are conclusive against further price increases this spring."

HARRISBURG, PENN.

After discussing the proposed anthracite mine code as drawn by James E. Roderick, chief of the Department of Mines, on Mar. 13, before the mines and mining committee, chairman Ramsey referred it, together with all other mine legislation, to a subcommittee of five, who in turn will meet with representatives of the operators, mine workers and the Chief of the Department of Mines in an effort to shape a complete program for anthracite mine legislation.

It is almost a sure guess, that the subcommittee will drag things along for several weeks, and as a result, the code will be dismembered and probably killed. There is also a strong likelihood of all other mine bills receiving the same fate, as the mine workers are more interested in getting amendments to the compensation act, than they are in new mining laws.

The code was attacked principally upon the grounds that it was drawn by the chief of the Department of Mines, and not by a commission, composed of operators and mine workers.

Cadwalder Evans, Jr., general manager of the Delaware & Hudson Co., David P. Reese, counsel, and Harry G. Davis, efficiency engineer for the Delaware, Lackawanna & Western R.R. coal department; District Presidents John T. Dempsey, Thomas Kennedy and James Mathews and Attorney Roger Devers for the Mine Workers' organizations participated in the discussion.

Attorney Devers argued that the code will seriously interfere with the provisions of pending legislation for surface protection, as the mine inspectors are given discretionary jurisdiction in permitting mining out of pillars.

An agreement was reached after the discussion upon the appointment of a subcommittee of five members of the mines and mining committee to meet with a committee of five operators and five representatives of the mine workers and the Chief of the Department of Mines and compare the proposed code with the act of 1911 and existing laws and to determine wherein the differences lie.

Against the miners' opposition to consideration of the code appeared Cadwalder Evans, Jr., of the Delaware & Hudson Co., and urged consideration of sections by comparison, as there were many good points in the proposed code which would be beneficial to both operator and miner.

The miners' representatives real aim seemed to be to have the code set aside for the present session of the legislature, arguing that it is impossible of performance, and that while the code is being considered by the committee, all of the mine legislation proposed would be side-tracked.

Representative David Fowler, sponser of the assistant mine inspector bill, inquired particularly about his measure, but chairman Ramsey explained that the committee work would not necessarily be held up pending the subcommittee's decision.

The Scarlet Mine Cave Bill, as introduced by Senator Lynch, which is out of the Senate Mines and Mining Committee and passed second reading during the week, has been returned to the committee. It is doubtful if it will ever again see the light of day.

Over on the House side prospects for surface support legislation look somewhat brighter. The Dawson bill, a twin of the one presented by Senator Lynch, is likely to go through, although a hard fight to accomplish this must be waged.

If the Dawson bill passes the House, it will find opposition in the Senate. Somehow the upper branch members do not seem to be much worked up over the necessity for surface protection in the anthracite region. The action so far on the Senate bill was purely courtesy to Senator Lynch.

Some active work in opposition to any mine cave legislation has already been put in by lobbyists for the coal operators. Possibility of labor organizations support is regarded by representatives from the coal counties as important, and they would welcome a move to include the United Mine Workers' lobby as advocates of the surface protection measures.

Attorney-General Brown, who is deeply interested in mine cave legislation, insists that the most advisable thing to do would be to encourage the introduction of other bills intended to solve the problem and to hold a series of hearings which could be attended by all parties at interest. Out of the subsequent discussion some solution could be approached.

When the Joint Revenue Commission of the legislature meets it will pave the way for the introduction of a bill imposing a tax of 2 per cent. upon the value of all coal mined in the state. The bill will provide for the return of one-half of the tax so collected to the county in which the money was raised to be used for general county purposes.

Attorney-General F. S. Brown, who has been studying the laws of other states which tax their natural resources, stated on Mar. 15 that the agreement on the 2 per cent. tax involved the support of practically every member of the powerful revenue commission. That a fight on the tax is expected from both the anthracite and bituminous interests is apparent.

Attorney-General Brown and James E. Roderick, chief of the Department of Mines, have been gathering data to submit to the revenue commission to indicate how much money would accrue to the state and to the counties from the collection of this tax.

The Davis bill, now in the House Committee on Ways and Means, imposing a tax of 2½ per cent., and dedicating half of the tax to the municipalities of the counties, will be amended to conform with the agreement of the commission.

Under existing law, the money cannot be used except for Governmental purposes, and whether any fund collected as a general tax can be applied to a special purpose of this kind remains for the state's legal department to work out. So far, the Attorney-General has not been interested in distribution of the tax, the principal effort being put forward to convince the legislature that a general tax on coal production is needed and possible.

Organized labor will demand drastic amendments and additions to the workmen's compensation law, and representatives of the state Federation of Labor and the United Mine Workers officials will confer with the Governor over a schedule of changes in the law to be submitted to the legislature. This conference will be held at an early date.

Some of the labor propositions are that compensation to an injured workman shall begin after the 7th day of disability instead of the 14th day, as now provided; that the compensation for the first 500 weeks of disability shall

be increased from 50 per cent. of the weekly wages to 66⅔ per cent., and that 25 per cent. of the weekly wage shall be paid after the 500-week period, beyond which the present law allows no compensation. An increase in the maximum amount of weekly payment from $10 to $13.33 is also included.

Under the amendments compensation is also extended for injuries to fingers and toes, not now covered by the act. The schedule for such injuries, according to the labor amendments, would be 50 per cent. of the weekly wage during the following periods: Loss of thumb, 60 weeks; loss of first finger, 40 weeks; loss of second finger, 30 weeks; loss of third finger, 20 weeks, and loss of fourth finger, 15 weeks. Loss of first joint of thumb or finger considered loss of half of finger, entitled to half compensation. Loss of two joints would be loss of the entire member. Ten weeks less than the schedule for fingers is allowed for injuries to the toes and foot.

The loss of hearing in one ear is to be compensated by 50 per cent. of wages for 50 weeks, and the loss of hearing in both ears for 100 weeks.

The regulations for medical service are changed by the labor amendments so that the service is provided at the expense of the employer for four weeks, not to exceed $2 per day, unless a surgical operation is necessary, and not to exceed a total of $75. Right to sue to compel the employer to pay the medical service charges is included.

In this connection the committee representing the various medical societies will back amendments changing the charges for medical service so that the attending physician may obtain rates commensurate with the service. These amendments will be drafted by Commissioner John Price Jackson, as a result of a conference with Dr. J. B. McAllister, chairman of the state physicians committee.

The compensation for fatal accidents, when the only surviving dependents are parents, is increased from 20 to 40 per cent. in the labor amendments. When the only dependents are grandparents or grandchildren the compensation is to be fixed at 25 per cent. with an added 5 per cent. for each additional dependent to a maximum rate of 35 per cent. of the wages. Compensation to a dependent widow or widower is required in the proposed amendments to be paid until the dependent shall die or remarry, or until he or she becomes self-supporting. The provision is added that in the case of alien widows, compensation shall not exceed 300 weeks, and for dependent children until 16 years old, unless physically or mentally incapable of self-support, when payments shall continue until incapability is removed.

Other amendments in the labor schedule include several to safeguard the employee's compensation in cases where the employer is a self-insured firm. One of these authorizes the state bureau to require the deposit of bonds or securities as a condition to granting an exemption from insurance in the state fund.

The bureau may also require exempted employers to set aside a fund as a reserve to guarantee compensation claims against it, just as the state insurance department requires insurance companies to set aside reserves to carry claims to maturity. It is also required that self-insured companies show, upon demand of the bureau, financial ability to meet compensation claims, and the bureau is given discretionary right to revoke the self-insurance license if the financial statement is unsatisfactory.

The Workmen's Compensation Board itself will not sponser any amendments save those relating to procedure, nor will it approve or oppose the labor amendments.

PENNSYLVANIA

Anthracite

Shenandoah—The Philadelphia & Reading Coal and Iron Co. is planning for several extensions and improvements in its local collieries in the spring.

Wilkes-Barre—The grand jury has indicted John Banaszek, Warrior Run, for digging coal illegally on property to which he held only surface rights. The charge covers the construction of a tunnel from his property to a mine of the Lehigh Valley Coal Co., and obtaining about 150 tons of coal before being discovered.

Hazleton—The Lehigh Valley Coal Co. has announced a reduction in the price of coal to employees, from $3.75 to $3.50 per ton, prepared sizes, and $2.60 to $2.50 a ton for pea coal.

Shamokin—Officials of the Susquehanna Coal Co., on Mar. 17, announced that a fire in No. 9 bed, of the Cameron colliery burning since Mar. 14, was under control. The operation is one of the largest in the region, and many men have been thrown out of work due to the fire.

Scranton—The Delaware, Lackawanna & Western coal mining department was the only one of the big anthracite mining companies whose shipments in February were greater than the same month a year ago. Every other company showed a decrease, but the Lackawanna shipments for the month increased from 839,472 tons in 1916, to 901,098 in February 1917. The output of the Lackawanna collieries has shown a steady increase for about a year.

Mauch Chunk—The Lehigh & New England R.R. is being extended from Nesquehoning to Coalport, the western terminus of the Lehigh Canal. Engineers are now engaged in establishing lines and grades. The road will be 5 mi. long and will run along the Coalport wharves. At present the coal is being brought from the Lehigh Coal and Navigation Co.'s mines in the Panther Creek Valley over the Central R.R. of New Jersey. When this new extension is completed the Lehigh & New England will extend from the Lehigh River to every colliery in the Panther Creek Valley and will carry the bulk of the coal traffic.

Bituminous

Greensburg—The Keystone Coal and Coke Co. has perfected plans for the apportioning of surface lands to its employees for gardening purposes. Encouragement will be given to the employees to farm the property for the raising of vegetables for personal use.

The Keystone Coal and Coke Co. and others have announced this policy of apportioning surface land to the miners to encourage gardening on a large scale. The coal companies have always encouraged gardening on a small scale by offering prizes each year but have never allowed the cultivation of large lots. The coal companies own large amounts of surface lands that have been lying idle and the Keystone company has announced that this land will all be given over to the miners for cultivation if they so desire. The Jamison Coal and Coke Co. will adopt the same plan, and other operators will probably follow.

Brownstown—A portion of this town, which was affected several months ago by mine caves, is again threatened. It is said that the settling is due to the old workings in No. 4 shaft. Cave-ins have interferred with the water mains.

Hungtingdon—John Langdon, a coal operator has purchased the control of Chevington & Dunn Coal Co., which carries with it the ownership of about 1000 acres of bituminous coal land, believed to contain millions of tons. The consideration was not announced. This tract of land is on Broad Top Mountain, Bedford County.

Boswell—The Standard-Quemahoning Coal Co. which has offices here, is contemplating the opening of a new coal plant in the vicinity of Thomas Mills. This will be a modern operation. When the new branch of the Baltimore & Ohio R.R. is built into that field the plant will be extended. It will be worked on a limited scale until the road is constructed.

Johnstown—Another victory has been won by the Pennsylvania Wagon Coal Shippers' Association. The announcement has been made that the Interstate Commerce Commission has suspended until July 15, 1917, the proposed amendment to the tariff schedules of the Pennsylvania R.R. The proposed amendment would have become effective Mar. 17. A similar case has been argued before the Public Service Commission and a decision is expected within the next few days.

Greensboro—The Gabler tract of coal about one mile from this place is to be developed by the Hay-Titus Coal Co. An incline and tipple for loading both by rail and river is well under way and shipments are scheduled to begin Apr. 1.

Nant-y-glo—The first coal to leave Nant-y-glo over the new branch of the New York Central R.R. was hauled on Monday, Mar. 19. Nant-y-glo has taken on new life and the outlook is so bright that a movement has been started to construct a park, to be located about two miles from town. The coal companies plan to boost the new project.

Uniontown—A contract has just been closed by the W. J. Rainey Co. for the concreting of the hoisting shafts at the Royal works with James, Ellinger & Strawn of this city. The consideration is between $40,000 and $50,000.

Masontown—The Poland Coke Co. is erecting a tipple on the Monongahela River side of its property in order to make shipments by coal barge on the river.

Waynesburg—Deeds have been recorded here covering the sale of 465 acres of coal in Cumberland Township to the Buckeye Coal Co., a subsidiary of the Youngstown Sheet and Tube Co. The consideration will average about $515 per acre.

Hudson—The Tipple at the coal mine of Thomas Lamb was destroyed by fire recently. This fire caught from a stove in the blacksmith shop adjoining the tipple. The damage done was considerable.

Yatesboro—An old mine at Rural Valley which has been abandoned several years and which furnished coal to the old Colwell Iron Works near here about 35 years ago has been reopened and is now shipping coal by rail over the Rural Valley R.R. and the Buffalo, Rochester & Pittsburgh Ry.

Pittsburgh—The examination for the office of State Mine Inspector was held in the ball room of the Monongahela House on Mar. 13, 14, 15 and 16, with the following men as the examining board: George S. Baton, Pittsburgh; Robert H. Kay, Saxton; E. A. Watters, Leechburg; William H. Gates, Graceton; and Stephen Arkwright, Mount Pleasant. Ninety applicants sat at the examination representing practically every county in the bituminous region. This is the first time that several of the inspectors were exempt from the examination on account of passing two successful examinations and serving in the office for eight years or two terms.

Reynoldsville—The temporary tipple to replace the one destroyed by fire at the Big Soldier mine of the Jefferson & Clearfield Coal and Iron Co. was completed in one week and all men resumed work the Monday following the fire. A new and modern steel tipple will be built on the site of the old one as soon as the weather will permit the construction.

Canonsburg—Fifteen men were killed in an explosion in the Hendersonville mine of the Henderson Coal Co. on Tuesday Mar. 13. The explosion occurred just as the night and day shifts were changing and thus there was a low death toll. Several men who were near the bottom of the shaft escaped alive. The mine is relatively a new one, having been opened only about two years ago and was modern in every respect. Coal dust is thought to have caused the explosion.

Brownsville—Four men lost their lives in an explosion in the Isabella mine of the Hecla Coal and Coke Co. on Sunday, Mar. 18. The cause of the explosion has not yet been determined but the investigation is in charge of W. H. Howarth, inspector of the district in which the mine is located.

WEST VIRGINIA

Bluefield—It is reported that Mr. and Mrs. Rowland Bryant have sold their coal lands on Laurel Run to the Pocahontas Consolidated Collieries Co. The consideration is said to have been $20,000.

Fairmont—Sets of hand-colored post cards, showing scenes in gardens and yards of employees of the Consolidation Coal company in the mining towns of this firm, where the welfare department of the company has been operative, are being distributed through the commissary department of the company. These cards show street scenes which in beauty rival those of well-ordered New England villages.

Charleston—The coal tonnage handled from the New River field during February was 10,000 tons short of that hauled over the Chesapeake & Ohio R.R. in the preceding month of January. The total output handled by this road in February was 518,000 tons, the greater part of which was sent to Tidewater. However, 111,000 tons were sent to eastern places inland, and 48,000 tons were shipped west, while 3640 tons was used as locomotive fuel. It required 8700 cars to move this output.

Pemberton—The Ragland Coal Co. expects to be shipipng coal next fall from its mines rerently opened near this place. This company has a lease on a 750-acre tract containing a 4-ft. bed of Beckley coal. Shipment may be made either by the Virginian or the Chesapeake & Ohio R.R. The coal bed lies about 60 ft. below the surface.

ALABAMA

Birmingham—The Tennessee Coal, Iron and R.R. Co. is constructing a modern concrete and steel washery plant at its Edgewater mine, with a capacity of 3000 tons per day. This will be the largest plant of its kind in the southern field.

Dolomite—The Woodward Iron Co. is constructing 50 new dwellings for its employees at Dolomite.

KENTUCKY

Seco—The South East Coal Co. is installing a new saw mill on a hardwood timber tract here where material for building operations will be manufactured on the ground. It plans the building of about 150 more houses, it is said.

Hazard—The City of Hazard which sprang into prominence in the development of the coal fields will do $50,000 worth of street improvement this year. Three miles of brick paving will be done, besides the building of much sidewalk. There are twenty-odd operations in close proximity to the city.

Coal operators of Hazard are behind a project to establish a general hospital. A building to cost $50,000 is planned.

Louisville—The Louisville & Nashville R.R. has agreed, it is stated here, to establish a system of rating the mines on its lines, according to their output capacities, pro-rating the car supply accordingly. This agreement is declared to cover the whole Louisville & Nashville system and it is expected that it will be similar to the plans used by the Baltimore & Ohio, the Chesapeake & Ohio and the Norfolk & Western. It is being worked out and should be in effect shortly. Heretofore the Louisville & Nashville has published no system for distribution of cars and operators have frequently complained that they have been neglected.

Harlan—The Tway Coal Co. is making increases in its plant at Martin's Fork—increasing from 20 to 25 cars daily. It proposes opening an additional mine a little later, and making a further increase. This increase is to be made within about 60 days.

The Rex Coal Co. in the Harlan field immediately above this city is preparing to make an increase in its output within 30 days. At that time it will be shipping about 15 cars daily.

OHIO

Columbus—Two bills of considerable importance to the coal trade and coal miners have been introduced in the Ohio legislature, with some prospects of success. One provides for an increase in the maximum death award under the workmen's compensation act, from $3750 to $5000; the other empowers the Industrial Commission in its discretion to award lump sum compensation to dependents, or to the worker himself, if permanently injured. At present a lump sum may be paid only in a limited number of cases.

Glouster—George M. Jones, of Toledo, has completed the deal for possession of the Continental Coal Co.'s properties, by the payment of about $1,267,000 in cash to representatives of the Guarantee Trust Co. and the New York Central Railway Co. The properties will be operated under the name of the Ohio Collieries Co. Twelve mines are included in the deal. No change in operation aside from that of the name will be made, except that John S. Collins, of Glouster, will for the time being act as superintendent of mines, succeeding the late D. H. Williams.

Cadiz—The entire property of the Pittsburgh Block Coal Co. was recently sold to the Verner Coal Co. of Pennsylvania. This property comprises the mining rights, plant and equipment located at Kenwood. The coal extends from the Wheeling & Lake Erie R.R. to the L. E. A. & W. R.R. The purchase price is said to have been over $200,000. The Verner company has taken charge of the property and it will soon be in active operation.

St. Clairsville—The Beluan Coal Co. will start a stripping operation near Smithfield about the 1st of April. The stripping shovel is already on the ground, and ready to begin work on 3000 acres of land which has been purchased.

Steubenville—A recent deal indicated how extensive the new Wayne Coal Co.'s stripping operations will be. This company has taken over the Modern Coal Co. for $195,000. Plans are still being formulated for operations in this county and in adjoining counties both in Ohio and Pennsylvania. Operations in the new fields in this county are expected to begin within the next few months.

Bellaire—Indications point to operations along Wegee Creek as soon as weather conditions will permit. Engineers have been at work drawing plans of the lower end of the farm recently purchased from George T. Ambler, and a mining town is likely to spring up there.

INDIANA

Bicknell—The American coal mine near here recently broke the former state record held for hoisting coal when 4777 tons were brought to the surface in 7 hr. 45 min. It required 97 cars to haul this product. The entire day's output was shipped to the Indianapolis market. The American mine has broken its own record three times during the past year.

Clinton—The Chicago & Eastern Illinois coal properties are preparing to sink a new shaft to the No. 5 bed a half mile west of No. 4 (Buckeye) mine in the Clinton field of Indiana. It is proposed to make this a pick mine, with motor haulage. The recent drill holes show a good thickness of coal. Ultimate capacity of the mine will be 2000 tons per day. It will be known as "New No. 2," as the present No. 2 will be worked out early in the summer.

ILLINOIS

Taylor Springs—T. C. Keller, receiver of Chicago & Eastern Illinois coal properties; M. A. Rowan, mining engineer; and H. E. Wilson, superintendent, recently inspected No. 15 mine, which has been closed for several years. It has been decided to reopen this mine at once. Sullivan long wall machines will be used, as well as motor and mule haulage.

Sesser—The Sesser Coal Co., in Franklin Co., Ill., has resumed hoisting after a two months' shut down due to the air shaft falling in early in January. It will soon have its normal tonnage again, as labor is returning rapidly.

Marion—Preparatory work has started at the mine of the former Keystone Coal and Coke Co. at Pittsburgh, which was recently sold at a bankrupt sale to Pittson, Penn., people. The mine has been idle for 3 years and has a capacity of 4000 to 5000 tons a day.

The Herrin Coal Co., which recently took over the Watson properties here has also secured 600 acres east of Whiteash. About 12 years ago a main shaft was sunk on what was known as the Goddard farm, but the proposition fell through. The new owners have got the main shaft down to the coal, and the air shaft almost completed, are contracting for the top works and expect to be producing coal in the early fall.

Harrisburg—J. K. Deering, now in charge of the operations of the O'Gara Coal Co., recently stated that the output of four of the local mines has been sold for one year. One of the contracts closed by the local operators recently was for the New York Central lines for 600,000 tons of mine-run for the coming year at $2 a ton at the mines.

ARKANSAS

Fort Smith—Official denial is made in a letter from J. G. Putterbaugh, sales agent for the McAlester (Okla.) Fuel Co., to the Fort Smith Chamber of Commerce, to persistent reports that the McAlester company is planning to enter Sebastian County, Arkansas, by securing leases in this county under contract to develop them. It is known that much of Sebastian County is underlaid with a bed of coal and it is believed development of this field will be but the matter of a short time.

Personals

Goerge Kellock, formerly mine manager for the McGillivray Creek Coal and Coke Co., of Coleman, Alberta, has been appointed general manager.

John J. Hazlett, connected with the Henderson Coal Co. for the past eight years, has been placed in charge of the Philadelphia office of the National Fuel Co.

Governor Henderson of Alabama has appointed S. N. Thompson, of Helena, Thomas Rosco of Birmingham and David Kelso of Wylam as Associate State Inspectors.

E. E. Wright, formerly assistant coal and coke agent of the Baltimore & Ohio R.R. at Cleveland, has been appointed sales manager of the Youghiogheny & Ohio Coal Co., at Cleveland.

K. D. Bailey, mine superintendent for the Consolidation Coal Co., at Hutchinson, W. Va., has severed his connection with that company and will join the forces of the Bethlehem Coal Co.

T. H. Devlin, State Mine Inspector of Illinois, has accepted the position of superintendent of the Johnson City Coal Co., at Johnson City, Ill. Mr. Devlin's former address was Assumption, Ill.

J. A. Winnerstin, formerly connected with the Allegheny River Mining Co. at Conifer, Penn., has accepted the position of mine foreman of the Eleanora mines of the Rochester & Pittsburgh Coal and Iron Co. at Eleanora, Penn.

John Laing, of Charleston, has been reëlected president of the Main Island Creek Coal Co. which operates extensively in Logan County, W. Va. He has occupied this position since the organization of the company. All the other officers have been reëlected, as were the directors.

J. W. Heron, chairman of the Car Allotment Commission of the Chesapeake & Ohio R.R., has been appointed to the newly created office of superintendent of fuel supply. This office has been created on account of the increasing difficulty which the railroad experiences in obtaining locomotive fuel.

Fred Green of Columbus, Kan., for the past two years a deputy mine inspector, has been appointed state mine inspector to succeed John Pellegrino. Mr. Green started in the mining industry 20 years ago. He went to work for the J. R. Crowe Coal Co. about 15 years ago, and advanced to foreman, and then to superintendent.

Industrial News

Coleman, Alberta—The International Coal and Coke Co. intends installing mechanical pushers at its coke ovens.

Philadelphia, Penn.—The Mill Creek Coal Co. has removed its general offices from Mauch Chunk to the Widener Building, Philadelphia.

Somerset, Penn.—W. H. Bradford & Co. has purchased control of the stock of the Victor Coal Mining Co., the mines of which are located at Holsopple, Penn., and main office in the Snyder Building, this city.

East St. Louis, Ill.—The huge C. B. & Q. coal chute just north of the relay station was destroyed by fire recently, causing a loss of several thousand dollars and paralyzing traffic in the terminal yards for several hours.

St. Louis, Mo.—The Taylor Coal Co., operating 5 mines in the Williamson-Franklin County field and the largest operator in southern Illinois, has established a St. Louis office in the Wright Bldg. with A. W. Robertson in charge.

Cincinnati, Ohio—Suit for $25,000 damages has been filed against the Campbell's Creek Coal Co. by the mother of a teamster who was killed in January by one of the company's employees. It is alleged that the trouble occurred in the company's yards.

Charleston, W. Va.—Officials of the Kanawha & Michigan Railway Co. have announced their intention of placing in effect at once an advance of 15c. a ton on coal from West Virginia to the Lakes. The proposed tariff will include the loading of vessels at Toledo.

Fairmont, W. Va.—The Battelle Coal Co. has purchased 300 acres of Pittsburgh coal in the Battelle district, of Monongalia County from E. N. Eddy and others at a price of $400 per acre. This property adjoins the holdings of J. V. Thompson, and the Little Kanawha Syndicate.

Hazleton, Penn.—Inquiry among auctioneers has revealed that the unusually large number of farm sales in the northeastern part of Pennsylvania is due to the scarcity of labor. This proved a severe handicap last fall. In many cases both tenants and owners are giving up. Hundreds of foreign-speaking miners are investing in land.

Coleman, Alberta—The McGillivray Creek Coal and Coke Co., intends driving a rock tunnel of considerable length in order to reduce the outside haul to the tipple, to about 1000 ft. The present distance above ground is over 8000 ft.

Philadelphia, Penn.—In an argument before the U. S. Circuit Court of Appeals here the Pennsylvania R.R. made a further effort to overthrow the award of $42,592.42 given to the Hillsdale Coal and Coke Co., of Indiana County, Penn., by the Interstate Commerce Commission on account of unfair car distribution. The court has not as yet made a decision.

Columbus, Ohio—Railroads leading from the coal fields to Lake ports in Ohio have filed with the State Utilities Commission a new schedule of rates providing for an advance of 15c. on the rate for Lake coal. The new schedule is to become effective Apr. 16, unless suspended by the commission. It is believed that little opposition to the new rates will develop.

Cleveland, Ohio—The Reiss Coal Co. of Sheboygan, Wis., with many docks along Lakes Michigan and Superior, is to become a producer as well as a dealer in coal. The company recently purchased 5000 acres of coal land in southeastern Ohio from the Roby Coal Co. The Reiss Coal Co. made the purchase, it is understood, with a view to an expansion in business.

Philadelphia, Penn.—The Pioneer Electric Mine Lamp Co. of Philadelphia was incorporated Feb. 12, 1917, and purchased the business of the Hirsch Electric Mine Lamp Co. W. F. Woodward the president and general manager of the Pioneer company is completely reorganizing the entire plant and product, and will offer many improvements in the electric mine lamp which will prove of value and interest to the mining world.

Uniontown, Penn.—Announcement was recently made of the sale of 225 acres of West Virginia coal with a mine tipple, machinery, mine equipment, dwelling houses, etc., by the W. A. Stone Fuel Co. at Maidsville to Clarksburg and Fairmont parties. The purchase price is said to have been $225,000. This property is situated along the Buchanan & Northern R.R., five miles north of Morgantown, and is adjacent to the Monongahela River.

Cumberland, Md.—At an expense of approximately a million dollars, the Baltimore & Ohio R.R. is constructing a line which will reach the extensive coal land holdings of the Elkhorn Coal Corp., in the Elkhorn Valley in Kentucky, thus opening to development approximately 25,000 acres. The Elkhorn Coal Corp. has made known its intentions of opening new mines on its Kentucky property. It is said that 12 such operations will be started shortly.

Altoona, Penn.—Work will be started at once loading the 76,000 tons of bituminous coal stored more than a year ago by the Pennsylvania R.R. at South Altoona. It will be delivered along the system wherever needed. This coal cost the company something more than $1 a ton. Today it is worth $3.50 to $5 a ton. The company will gain approximately $150,000 on the deal. The coal was stored when indications pointed to a strike of miners prior to the adjustment of the wage scale last spring.

Cincinnati, Ohio—The Continental Coal Corporation, of Pineville, Ky., and the company's reorganization committee, consisting of creditors, have filed in the United States Circuit Court of Appeals an appeal from the order of the United States District Court at Covington, Ky., adjudging the company bankrupt. The principal ground for objection to the ruling is that the company had entered voluntary bankruptcy proceedings at Chattanooga before the involuntary proceedings at Covington were started.

Cresson, Penn.—The Pennsylvania Railroad Co., has started the construction of a large railroad yard at this place. This will mean the expending of over $1,000,000, and when completed will be the largest yard between Pittsburgh and Altoona. A new passenger station will be erected at another point in the town and the present site given over to a portion of the shops. These improvements are made necessary by the heavy increase in the coal freight from the branches out from Cresson, which join with the main line at this point. It is also rumored that the mountain division will be electrified but this has not been officially confirmed as yet.

Philadelphia, Penn.—The Pennsylvania R.R. has filed with the Interstate Commerce Commission new tariffs on bituminous coal from Central Pennsylvania points and to lower Lake ports. Approval is asked for increases of 5c. per gross ton to New York and the same amount to Philadelphia and Baltimore for outside the Capes. The increase to lower Lake points is to be 15c. per net ton, taking effect Apr. 16 next. Southern roads have also filed new rates to southern ports increasing the present tariffs by 10c. a ton. The new rates, if approved, will change the existing differential by 5c. per ton. The present rates are $1.55 to the New York district for a haul of approximately 350 miles, $1.25 to Philadelphia for a haul of approximately 265 miles and $1.40 to southern ports for hauls of about 440 miles. Shippers at northern ports have contended that there was a discrepancy which operated in favor of southern ports. The new rates would increase Philadelphia's favorable differential by 5c. and reduce the differential for New York, as compared with southern ports, by a like amount.

Market Department

GENERAL REVIEW

Uncertainties create a mixed situation in anthracite but supplies are short. Bituminous somewhat easier with consuming interests testing the market severely. Early opening of Lake navigation. Softening tendency in the Middle West counteracted by increasing demand from the upper ports.

Anthracite—The uncertainties occasioned by the question as to whether the customary April discount will be put into effect, together with the readjustment in freight rates in Pennsylvania, supplemented by the other irregularities incident to the opening of the spring trade, have all combined to create a decidedly mixed situation in the hard-coal market. The initial effect of the announcement of the Federal Trade Commission that the anthracite operators should make the customary reduction Apr. 1, was to cause a heavy cancellation of orders, but the severe cold snap at the opening of the current week, together with a more general knowledge of the limited powers of the commission caused many buyers to go back into the market. The outstanding feature, agreed upon by all, is the significant fact that coal is short; the big storage reserves of the large companies are cleaned out to practically the last ton, so that the trade is entirely dependent on the daily production, and consuming interests are working on too narrow margins to consider withdrawing from the market under these conditions.

Bituminous—The threatened railroad strike at the end of last week checked the downward tendency of the market for the time being, but the situation is again notably easier, though by no means weak. The rail movement is still so inadequate that the volume of free coal continues very limited, but the approach of spring together with the first break in the consistently cold weather that has marked the past winter, has had a strong sentimental influence on consuming interests. There is a very marked disposition to stay out of the market to the very last moment, and there is considerable trading of tonnage among the retail interests to accomplish this end. Consumers will certainly test the market very severely before they will accept the ruling prices as final, and modifications from these high levels may be expected as speculation diminishes. Some well defined headway has been made toward relieving the terminal congestion, but on the other hand reserve stock at the distributing centers and in the bins of the consuming interests have probably never been at such a low ebb.

Ohio Valley—A moderate improvement in the rail movement and anticipation of a still further bettering of conditions in this respect has created an easier feeling. There has also been a very marked slowing up in domestic buying, consumers and retailers restricting purchases down to the very minimum in order to avoid a carrying over of any high-priced stocks into the summer period. A few cold snaps may still be expected, however, and this together with anticipation of an early stocking movement, and the fact that steam consumers are readily absorbing all available surpluses, has eliminated the possibility of any important recessions. Owing to the very acute shortage of coal at the upper Lake ports, efforts will be made to start coal up the Lakes at the earliest possible moment, the official date for the opening having been set as Apr. 16. The contract market is very narrow, operators becoming even more averse to committing themselves.

Middle West—The mixed conditions characteristic of the transitional period at this season of the year, are becoming more apparent, with the general tendency of the market downward. The well defined improvement in transportation, which is increasing the tonnages and taking the sharp edge off of the more urgent demand, is also a contributing factor. The softening is of very moderate proportions, however, terminal congestions still being in evidence, while reserve stocks continue at a sufficiently low level to cause a feeling of uneasiness. There is a very persistent and increasing demand for tonnage from the Northwest; the docks are practically bare of coal and the Middlewestern mines will have to be drawn upon for supplies until the Eastern coals begin to arrive. Some of the Western roads have been obliged to abandon their aggressive efforts to break the contract market by withholding orders, due to their very short supplies.

A Year Ago—Anthracite companies breaking all previous tonnage records for March. Bituminous market decidedly mixed, and much upset by railroad congestion. Lake shippers concerned over the scarcity of coal. Middlewestern market softer, but higher prices are noted on new contracts.

Comparative Average Coal Prices

The following table gives the range of mine prices in car lots per gross ton (except where otherwise noted) on 12 representative bituminous coals over the past several weeks and the average price of the whole group for each week:

Boston	Year Ago	Mar. 24	Mar. 17	Mar. 10
Clearfields	$1.35@1.75	$5.75@6.00	$5.90@6.75	$5.90@7.00
Cambrias and Somersets	1.55@2.00	5.25@6.00	6.15@7.25	6.15@7.25
Pocah. and New River[1]	2.80@2.85	7.00@7.25	7.00@7.25	7.00@7.25
Philadelphia				
Georges Creek (Big Vein)	2.25@2.50	6.25@6.50	6.25@6.50	6.50@7.00
W. Va. Freeport	1.40@1.50	5.50@5.75	5.50@5.75	6.00@6.25
Fairmont Gas mine-run	1.40@1.50	5.25@5.50	5.50@5.75	6.25@6.50
Pittsburgh (steam coal)[2]				
Mine-run	1.15@1.30	3.75@4.00	4.00@4.25	5.00@5.05
¾-in	1.25@1.40	3.75@4.00	4.00@4.25	5.00@5.05
Slack	1.10@1.15	3.70@3.80	4.00@4.25	4.75@5.00
Chicago (Williamson and Franklin Co.)[2]				
Lump	†1.50@1.75	3.75@4.00	3.50@3.75	3.75@4.00
Mine-run	†1.15@1.25	3.00@3.25	3.00@3.25	3.50@3.75
Screenings	.95@1.00	2.75@3.25	2.75@3.25	3.00@3.25
Gross average[3]	†1.49@1.66	$4.64@4.94	$4.80@5.19	$5.36@5.61

Gross Averages	
Nov. 18	$4.78@5.21
Nov. 25	4.80@5.33
Dec. 2	4.71@5.17
Dec. 9	4.69@5.15
Dec. 16	4.48@4.90
Dec. 23	4.67@5.08
Dec. 30	4.73@5.19
1917	
Jan. 6	5.16@5.53
Jan. 13	4.74@5.11
Jan. 20	4.54@4.98
Jan. 27	4.64@5.03
Feb. 3	4.66@4.86
Feb. 10	4.70@4.95
Feb. 17	4.67@5.04
Feb. 24	4.95@5.29
Mar. 3	5.10@5.48

[1] F. o. b. Norfolk and Newport News. [2] Per net ton. [3] The highest average price made last year was $4.80@5.33 made on Nov. 25. † Price higher than the previous week.

BUSINESS OPINIONS

Iron Age—Prices are undeniably the main concern of the iron and steel trade. This week, like those preceding, marks further advances. Those already made have been fairly well tested and there is nothing discernible that is calculated to reduce them for many months unless it be a lack of balance in respect to the new capacity being completed from time to time. International conditions have, if anything, stimulated demand. Foreign bidding for materials seems not to have diminished in any particular and many domestic consumers are eager to secure forward protection.

American Wool and Cotton Reporter—Waiting for developments in connection with the Government orders and the small quantity of wool on hand have made the wool market quiet for the week under review. There is no special change in conditions, prices generally remaining at about the same levels although in some cases they have advanced. The acceptance of bids would tend to bring a medium and low wool scoured in South America into prominence.

Bradstreet—Though confronted by unsettling elements born of the threatened strike of railway hands, the more acute situation in our foreign relations, railway embargoes and high prices of all commodities, current trade as well as industry continues of large volume, buying being larger, in fact, than at this time last year. Yet a sifting of the reports clearly discloses a tendency toward conservatism in lines other than iron and steel, this development being particularly noticeable in connection with distant buying, and merchants in general evidently aim to guard against stocking up with high-priced merchandise.

Dun—No departure from conservatism is witnessed, but in some quarters there is less hesitancy and general business holds up remarkably well considering the many hindrances. Traffic drawbacks have been aggravated by railway labor conditions and impede progress in many directions, while the foreign situation still exerts a restraining influence and induces continued caution in finance, trade and industry. Yet among interests whose forward needs are not adequately covered uncertainty regarding future supplies prompts renewed purchasing, and pressure upon leading producing forces does not appreciably diminish. Commercial failures this week are 269, against 255 last week, 337 the preceding week and 327 the corresponding week last year.

Dry Goods Economist—With the optimism which seems to be inherent in the trade right along, buyers continue to operate steadily. Those who are accustomed to work far in advance have shown no hesitancy in providing for distant requirements when sellers were willing. The shortage of raw materials, coupled with the prospect of a steady demand for the finished product, has evidently had much greater weight than the threatened strike of railroad employees, the sinking of an American ship by a German submarine and other developments of a disquieting character.

Marshall Field & Co.—Wholesale distribution of dry goods for the current week has been in excess of the same period 1916. Adverse weather conditions all over the country have retarded retail distribution which has influenced a smaller volume of road sales than for the corresponding period of a year ago.

CONTRACT PRICES

Boston—The quotations of $7.25 on cars Boston have been withdrawn, due to the stiffening in marine freights, and under existing conditions for spot coal and steamer rates, distributors could not do much better than $11 on cars, today.

New York—Buyers are receiving little encouragement concerning new contracts, and it is understood that one large consumer has been unable to cover in spite of strenuous efforts to do so.

Hampton Roads—With the end of the contract year at hand, consuming interests are obviously nervous concerning their requirements for the next 12 months. A number of the larger operators state that they are covered with all the tonnage they expect to contract for, and will reserve the balance of their output for the spot market. The few contracts now being closed are at an advance over the recent quotations of $3 per net ton f.o.b. mines.

Philadelphia—There is considerable activity in contracting on the anthracite steam sizes, and there have been some heavy tonnages of buckwheat closed at $3 per ton. The high prices on bituminous coal will enable the anthracite men to obtain very substantial increases on the anthracite steam grades, on which they will probably rely for their chief profits during the coming year. Bids opened by the city government on Tuesday of this week showed prices of $5.20@7 on pea coal delivered to various plants during the next three months and about 70c. higher for nine months. Buckwheat was quoted at $3.38@4 for three months with bituminous at $6.25; the former was 25c. higher for nine months and the soft coal 50c. higher.

Pittsburgh—The withdrawal of the producing interests has made the contract market very narrow. Some of the independents are quoting $3.50 for the 12 months' period, which is as near as the market can be quoted at present.

Buffalo—The situation is so confused that both consuming and producing interests are very backward about committing themselves, and it is understood that not 30% of the customary business has been taken as yet. Public Service Corporations, who usually contract at this time, have uniformly stayed out of the market.

Cleveland—There is considerable activity in contracting. On Pittsburgh No. 8 coal 12-month contracts have been concluded for 100,000 tons of mine-run, another for 150,000 tons of mine-run, and a third for 125,000 tons of slack, all at $2.50 per ton. There has also been a contract for 100,000 tons of three-quarter coal for shipment during Lake navigation at $2.75 per net ton f.o.b. mine.

St. Louis—A contract for Williamson County coal involving 2000 tons of mine-run a week, to run for one year, has been concluded at $1.37½ per ton at the mine though this compares with the ruling figure of $2, which figure it is also understood will be withdrawn. A small railroad contract has been closed for Carterville mine-run at $2 and another for Carterville No. 2 nut to be shipped to an electric light plant in the Northwest at $2.35.

Chicago—Operators are now definitely opposed to committing themselves for any important tonnages, though consumers are pushing hard for contracts. There are considerable negotiations

on very long term contracts, some running for as much as ten years. Central Illinois operators are closing for small tonnages at around $1.25 to $2, and some Indiana mine-run has been covered at $2. A feature of the Western market this year will be the almost total absence of Eastern coals. Predictions of $6 coal at the upper Lake docks are freely made, this price comparing with $3 last year.

Louisville, Ky.—The Chesapeake & Ohio R.R. has concluded a 5-year contract for taking the entire tonnage of the Keyser Coal Co., amounting to 1000 tons per day at $1.25 per ton.

Birmingham, Ala.—It has come to light that the Seaboard Air Line closed contracts the first of the year a $1.50 per ton, and during the latter part of January at $1.75 per ton, these contracts to become effective July 1. Previous prices on these contracts were about $1.15. On the first of March the Southern Ry. covered for 900,000 tons of Big Seam coal, on the basis of $1.65, the contract becoming effective immediately and expiring June 30, 1918. On Mar. 1, the Louisville and Nashville covered one million tons, deliveries to run until June 30, 1918, at $2, as compared with $1.23½ on the old contract. The following day the Atlantic Coast Line renewed an expiring contract on the basis of $2, as compared with the old price of $1.25. The Frisco, Illinois Central and other lines will shortly be in the market, and are expected to pay a $2 minimum price.

Atlantic Seaboard

BOSTON

Slight easing up of prices except on Pocahontas and New River. Spot quotations at Hampton Roads continue as for weeks past. Pennsylvania grades are off, in some cases $1 per ton. Anthracite buyers still pushing for coal but independents modify their quotations.

Bituminous—Pocahontas and New River have not shared in the slump in prices noticeable on other grades the past week. The agencies at Hampton Roads are of course more closely confined to contracts and to current sales made earlier, and with car supply so poor there has been only a very small volume available for spot sale. Dispatch has improved at the piers, the shippers having been very conservative about accepting bottoms. Demand from the West is still strong and operators have a buoyant market in every direction.

The local market has dropped off somewhat from the extreme panicky prices of the past month, but is by no means weak. Small lots are still selling up to $12 on cars Boston for coal of only fair quality. It has to be admitted, however, that the approach of spring has more than a sentimental influence upon buyers. The past week has shown about the first break in the consistently cold weather that has prevailed since November. Consumption is a little less and there is nothing like the apprehension of a few weeks ago. Retailers who have cargoes en route are borrowing from neighbors and there is a decided inclination to temper the market before trying to make further purchases. With surprisingly few exceptions on the Hampton Roads coals consignees and consumers have understandings if not contracts with the same interests who furnished their supply last year. Consumers who were tolerably well satisfied with the way the agencies looked after them last year have shown a readiness to place themselves in the same hands for another year.

At most of the New England mills stocks are very light and contractors have been able only to keep them supplied from week to week with only a narrow reserve margin and naturally there will be no effort to accumulate between now and Apr. 1 when so many low-priced contracts expire. Portland and other points in Maine are feeling the shortage very acutely. The Bangor & Aroostook R.R. normally relying upon water coal via Searsport, was obliged to have a special train go through direct from the mines in order to keep its freight service running until cargoes could arrive. Several times lately this line has been down to a few days' supply.

No news is disclosed on contracts. Shippers who made quotations on the basis of $7.25 on cars Boston or similar points have now withdrawn them on account of the strong position of marine freights. Based on present figures, spot coal and current rates on steamers, distributors are not in a position to name prices at much less than $11 on cars today.

The Georges Creek factors have apparently retired definitely from any canvass for new contracts. They are not making any prices and the indications are they will place their steamers and barges from trip to trip with such coal as they may find available and then remain extremely close-handed on commitments. Another advance because of the mine wage scale was announced recently on 1916-1917 contracts, amounting to a fraction over 17c. per ton.

Spot prices on the Pennsylvania grades have flattened materially since last week. Clearfields have been quoted down to $5.25 f.o.b. mines, and in a few cases $5.75 and $5 have been named where deliveries were extended for three weeks or a month. There is less coal in transit, in anticipation doubtless of a slackening demand, and quotations are likely to be further modified as speculation diminishes.

At Philadelphia and New York surplus coal is still being readily absorbed. At Long Island Sound ports the rates of freight are so much less from New York than from other loading piers that the shippers are in position to undersell. Pocahontas and New River for prompt delivery still realize handsomely. The mines are still much hampered by lack of cars, but it is plain that the traffic congestion at the terminals is now clearing up.

Bituminous at wholesale is quoted about as follows, f.o.b. loading ports at points designated per gross ton:

	Clearfields	Camb. and Somerset
Philadelphia	$6.25@6.75	$6.50@7.00
New York	6.50@7.00	6.75@7.25
F.o.b. mines	4.75@5.60	5.25@6.00
Alongside Boston (water coal)	8.90@9.50	9.15@9.75

Pocahontas and New River are quoted at $7 to $7.25 f.o.b. Norfolk and Newport News, Va., for spot coal, and $11.50 to $12.50 on cars Boston or Providence for inland delivery.

Anthracite—Unmistakably there are indications of domestic sizes being less difficult to get. Retailers who have been pounding shippers for months are now being awarded a cargo here and there and with the milder weather the situation is that much easier. Independent operators have modified their prices during the week to quite an extent. F.o.b. Philadelphia premium coal has softened from $7.50 to $7 and all-rail egg has been quoted as low as $5. At the same time it will take a long time for Tidewater dealers to get much ahead of the demand from the consumer. Practically everywhere in New England the severe weather has reduced consumers to very small supplies and there is likely to be the same rush to get coal that was evident a year ago.

Meanwhile, anthracite buyers are interested to learn developments on the subject of opening prices. The attitude of the Federal Trade Commission in favor of a reduction has added to the difficulties of the shippers in reaching a conclusion. It is impossible, apparently, to get any advance informaion, for the reason probably that a policy has not yet been determined upon. It is plain, however, that the few companies who have retained transportation to serve this market are going to have all they can possibly do to give New England the hard coal it requires.

Pea and broken sizes are in very short supply at all points.

NEW YORK

Company coal more plentiful but independent product continues to take premiums. Buyers of anthracite waiting for spring announcement before placing orders for April delivery. Hard steam coals scarce. Bituminous prices hold stiff. Industrial plants and some corporations short of supplies.

Anthracite—With more company coal available independent miners are not obtaining more than $1 a ton premium for the domestic grades. However, dealers are not getting all the company coal needed and are forced to piece out their requirements with the independent product. Retail dealers refuse to place orders for April delivery until some announcement is made concerning the spring discount.

Production in the Schuylkill region slowed down a little owing to excessive freshets. There is considerable apprehension among the operators over labor conditions which seem to become worse. The fear of a railroad strike stimulated buying slightly but transportation was so slow that shippers were not able to make deliveries. Much complaint is heard of the slowness in deliveries at the docks and the consequent delay in the loading of boats, some shippers paying heavy demurrage charges as a result.

There is some interest being taken in the effort of the city to lay in a month's supply of coal, bids for which are to be opened on Mar. 29.

Local shippers are receiving many inquiries from New England for immediate shipments.

The hard steam coals continue in strong demand but receipts are slow. Some independent boiler coal has been offered and quickly picked up.

There was a decided slump in the quotations for independent product on Tuesday. Demand fell off and buying was almost at a standstill. Shippers had difficulty in getting more than company circular for their holdings of domestic sizes. Quotations on the buckwheat sizes also dropped considerably.

Current quotations, per gross ton, f.o.b. Tidewater, at the lower ports are as follows:

	Circular	Individual
Broken	$4.95	.....
Egg	5.45	$5.45@5.70
Stove	5.70	5.70@6.00
Nut	5.75	5.75@6.00
Pea	4.00	5.00@5.25
Buck	2.75	4.75@5.00
Rice	2.20	3.75@4.00
Barley	1.95	2.75@3.00
Boiler	2.20	2.50@2.75

Quotations at the upper ports are generally 5c. higher on account of the difference in water freight rates.

Bituminous—The settling of the threatened railroad strike resulted in an easier feeling in the bituminous market. There has been an increased call for supplies and the early part of the week found little spot coal in hand; in fact some shippers believed there was less coal at New York Tidewater than at any time during the past several weeks. Prices show little deviation from last week and this is one of the surprises of the market.

Production has not increased and many industrial plants and some corporations are running with but a few days' stock on hand. Some transportation companies are considering the advisability of suspending a portion of their operations until assured of a more plentiful supply of fuel.

Free coals are scarce. The increased buying because of the fear of a transportation tie-up resulted in a clean-up and some shippers were almost entirely out of coal the first part of the week. Contract coals were scarce and the situation looked serious for a time.

Buyers are not receiving much encouragement from shippers regarding new contracts. One corporation using a large tonnage is said to have been unable to close up for this year's supply.

Car supply shows no improvement, most operators running far below their normal requirements. The railroads continue to take large tonnages and are anxious to close contracts for future supplies.

Many of the mines were idle on Monday due to lack of cars. Operators are again worried over threatened labor troubles. Mine workers in the Clearfield and Cambria regions are to hold a meeting at Du Bois on Mar. 26 at which the question of withdrawing from the United Mine Workers of America and the organization of a new union will be discussed.

Current quotations, per gross ton, f.o.b. Tidewater, for various grades are as follows:

	Port Reading	South Amboy	Mine Price
George Crk. Big Vein	$7.50@7.75	$7.50@7.75	$5.25@5.50
Tyson	7.25@7.50	7.25@7.50	5.00@5.25
Clearfield	7.00@7.50	7.00@7.50	5.25@5.50
South Frk.	.....	7.50@7.75	5.50@5.75
Nanty Glo.	.....	7.50@7.75	5.50@5.75
Som'r. Co.	7.00@7.25	7.00@7.25	5.00@5.25
Que'ho'ing.	7.50@7.75	7.50@7.75	5.25@5.50
W. V. Fa'rm't Th'r'qua	7.00@7.25	7.00@7.25	4.75@5.00
Mine-run	7.00@7.25	7.00@7.25	4.50@4.75
West. Md.	7.00@7.25	7.00@7.25	4.75@5.00

PHILADELPHIA

Anthracite trade unsettled. Freight reduction soon effective. No information yet as to new prices. Bituminous prices declined but react again on strike rumors. Embargoes placed by railroads. Fancy prices for immediate deliveries.

Anthracite—Now that the reduced freight rates to this city are to become effective within the next three weeks the consumers seem to have the assurance of at least a 25c. reduction on prepared sizes this spring. The uncertainty as to the new prices has the trade very much unsettled. The sales agents have been besieged all week by the retail men seeking information, but they received very little satisfaction.

Last week with the strike looming up as a menace to shipments many dealers began to regret that they had been so hasty in canceling their orders as a result of the Federal Trade Commission's announcement. This was impressed upon them as the requests from their customers began to increase. While most dealers seemed to have plenty of stove the sudden renewal of trade rapidly diminished the stocks of chestnut. Shortly after this the railroad companies notified the shippers of an embargo placed against shipments of anthracite and salesmen of a number of companies were notified that in accepting orders it must be done with the understanding that shipments would be subject to railroad delay.

The New England market is holding up and it is claimed that strong assurances come from the dealers there that they will buy to their capacity this spring and summer. In fact some individuals are reporting sales there now at prices close to $5 for egg, stove and chestnut.

Locally all premiums have ceased, excepting possibly in pea coal, and it is amusing now to see the salesmen of some of the smaller houses offer a few cars of prepared coal at circular with a benevolent air. The companies and individuals are both shipping at circular prices, but the former are sure to be favored, at least for a time. Later we expect to see some of the latter either cut prices or offer credit inducements to regain their trade.

Both the wholesale and retail trade are looking forward to an unusual spring and summer. If the prices are cut the usual 50c., this, together with the 25c. freight reduction on prepared coal and 15c. on pea, will make a handsome reduction for early buyers.

While the demand for most sizes has eased off considerably, the clamor for pea coal and the

smaller sizes continues. There is probably less pea coal in the yards of the retail dealers now than at any time during the entire season. Pea is now being used extensively to help out small buyers until warm weather arrives. Now with the storage piles exhausted and the shippers depending on the daily production they find themselves unable to meet the demand. The dealers have accepted it as a fact that the price on this size will advance, but anxious as they are to store they are grateful if they can supply their present needs. One dealer reports he has recently sold 1000 tons of chestnut to trade whose call has always been for pea. Indeed it is doubtful if the dealers will be able to buy and store any appreciable quantity as they had expected to during the coming summer.

There is a possibility that pea coal will nearly disappear from the domestic market during the coming year. With buckwheat quoted by the larger companies at $2.50 per ton, there will very likely be an attempt to widen the gap between this price and the circular price of pea coal, $2.80. If the usual 50c. reduction is granted on the larger sizes it would be natural to add 50c. to the price of pea, which would bring it to $3.30. Then with the spring reduction of 50c., which was last year made to include pea as a domestic size, it would sell during the first month at the old price of $2.80 and later advance until the winter maximum of $3.30 is reached. Even under these conditions pea coal at $3.30 per ton will be cheaper to use for steam production than any bituminous coal. The prevailing contract price for bituminous coal is $3.50 and with a smaller quantity than ever under contract the most natural thing will be to buy pea coal.

As further supporting this line of reasoning it must be remembered that the larger anthracite companies have not yet began to openly contract for steam coal, yet it is known without a doubt that contracts for heavy tonnages of buckwheat have been quietly closed at $3. We know of one large shipper who on account of having most of its buckwheat under contract has actually made tenders of pea coal for manufacturing purposes at $3.50. As a matter of fact it has been urged that one of the reasons for the usual spring discount being given is that the larger companies will endeavor to take their profits this year on the steam and manufacturing sizes. By the latter is meant the large sizes such as steamboat and broken, on which large contracts have been quietly made with gas companies and furnaces at good increases. Some companies have even closed contracts for good tonnages of egg for the same purpose.

From this it would appear that the small user of anthracite steam coals will be hard put to secure protection, and many are the anxious inquiries they are sending into the larger companies. In ordinary times with the beginning of the contract year but a few weeks away most of the business of this kind would have been closed.

The prices per gross ton f.o.b. cars at mines for line shipment and f.o.b. Port Richmond for tide are as follows:

	Line	Tide		Line	Tide
Broken	$4.25	$5.40	Buck	$2.50	$3.40
Egg	4.15	5.25	Rice	2.10	3.00
Stove	4.10	5.60	Boiler	1.95	3.15
Nut	4.50	5.55	Barley	1.85	2.05
Pea	2.80	3.70			

Bituminous—After continuing the downward movement of the past few weeks the market reacted, due to the impending railroad strike, at the end of last week. Prices suddenly strengthened and regained most all of the lost ground, with the exception of a few of the Fairmont grades. The demand for slack coals continues to increase, due to the increasing activities of the large cement plants in this district; as a matter of fact slack is now bringing more than the run-of-mine. As the day of the railroad strike drew near the demand for spot coal became very strong and at times quite fancy prices were paid for coal that was actually in sight, and quotations were usually made for almost immediate delivery.

Shippers generally refused to make contract tenders, although the buying interests became very active in their requests for quotations of this kind. The car supply recently has been running around 30 to 40 per cent. and the deliveries were also beginning to show considerable improvement up to the time embargoes were declared by the railroad companies. Since the threatened hostilities with Germany ocean charters have fallen off very considerably, although a little activity has been shown within the last few days.

The prices per gross ton f.o.b. cars at mines are as follows:

Georges Creek Big Vein	$5.25@6.50
South Fork Miller Vein	6.25@6.50
Clearfield (ordinary)	6.00@6.25
Somerset (ordinary)	6.00@6.25
West Va. Freeport	5.50@5.75
Fairmont gas lump	5.50@5.75
Fairmont gas, mine-run	5.25@5.50
Fairmont gas, slack	5.00@5.25
Fairmont lump, ordinary	5.00@5.25
Fairmont mine-run	4.75@5.00
Fairmont slack	5.00@5.25

BALTIMORE

Poor coal movement accentuated by Baltimore & Ohio strike, and record-breaking spot prices ruled for a time. Coke and anthracite scarce.

Bituminous—The coal market here was in chaotic state early in the week. The already wretched fuel movement to this city was greatly accentuated by the Baltimore & Ohio's brief but demoralizing strike. For two days not a car of coal moved, and then came days of but slow deliveries as the railroad worked overtime to catch up. Prices soared at tide here until spot coal was selling about $2, mine basis, above the offerings at the mines themselves, but coal at the mines was unattainable, and with no promise of early delivery. There was a time when as high as $8.50 a ton, mine basis, was recorded on a sale of soft coal here. Coke at the same time soared until as high as $15 a ton was paid for some limited quantities here. At present the price of spot coal is fixed largely by the necessity of the consumer, which in some cases is extremely acute, many manufactories now running on but a two-days' reserve supply.

The middle of the week saw the stiff market break somewhat, under lower quotations at mine centers. Receipts at tide remained very light, and the spot market was strong and beyond possibility of delivery with supplies on hand. From mining centers of interest here came quotations of from $5 to $5.50 for gas coals; and of from $5.50 to $6.25 for steam fuels. The spot market here, mine basis, remained from $1 to $1.50 in excess of these figures.

Quotations at the mines for delivery to the trade were about as follows: Georges Creek Tyson, $6.25; Somerset, $5.50 to $6; Quemahoning, $6; Clearfield, $5.50; Freeport, $5.25; Fairmont gas, three-quarter, $5.50; run-of-mine, same, $5.50; slack, same, $5 to $5.25.

Anthracite—A cold spell that dropped the mercury into the twenties made late ordering heavy and coal men are unable to handle but a small part of this business. Nearly everybody is short of some particular size, and receipts have been far below necessities. The trade too is still guessing what Apr. 1 will bring them in the way of a schedule and all contracting is held up pending this.

Exports—The export movement remains very light. There were a couple of loadings recently. Incidentally one boat was held up several days for lack of enough coke to complete cargo, and a large coal carrier waited nearly a week in order to get enough coal to get away.

HAMPTON ROADS

Consumers anxious to close and contract prices are firmer. Spot quotations at recent levels. No stocks on hand. High volatile increases in price. Congestion of vessels at times.

With current contracts about to expire consumers are becoming nervous and are endeavoring to profit themselves for the next twelve months. Suppliers are still holding off and closing with their most favored customers, if at all. Several of the larger interests express themselves as having all the tonnage they care for under contract and intend reserving the remainder of their output for the spot market. The few contracts closed from day to day are invariably at an advance over the recent quotation of $3 per net ton f.o.b. mines. If present conditions continue for any length of time the bunker price will be advanced for any future contract business.

Spot quotations still hover around the $7 mark and it is difficult to secure any coal at less than this figure. In fact considerable business, in the aggregate, is refused at this price on account of poor and uncertain receipts. No one seems to be willing to quote ahead for any tonnage as it usually happens when the date of shipment arrives prices are better than on the date of securing the order. Exports are still active and, while it is not possible to give the destinations of the cargoes, it can be said that the movement is generally to the same destinations as recent months.

Stocks are very light and were further depleted by the storing of coal by consumers in anticipation of the railroad strike last week. Embargoes of the latter part of last week were felt in decreased receipts for several days. High volatile movement via tidewater is large and prices for this grade of coal show unusual strength. Recent quotations are around $3.50 per net ton f.o.b. mines. Freight rates for this coal is usually 10c. per ton higher than the Pocahontas and New River Districts. The Navy Department is moving a considerable tonnage to the Navy Yards at Boston and Portsmouth and to the coaling station at Melville, R. I.

Prices are as follows for Pocahontas and New River run of mine: For export and coastwise shipment $7 per gross ton; for local delivery on tracks in carload lots $6.50 per net ton, for bunker delivery $7.50 per gross ton, plus 15c. trimming. Anthracite $9 per net ton delivered. High volatile $5.50@$6 per gross ton f.o.b.

Dumpings at the Hampton Roads piers for the past several weeks were as follows:

	Feb. 24	Mar. 3	Mar. 10	Mar. 17
Nor. & West.	127,765	100,118	112,618	160,247
Ches. & Ohio.	125,089	122,483	94,423	124,166
Virginian	69,014	127,902	77,982	84,747
Total	321,868	350,503	285,023	369,160

Ocean Shipping

OCEAN FREIGHTS

The freight market is practically the same as a week ago, and although numerous steamers were chartered during this period for export coal, only two actual fixtures were reported, the Danish steam "Ribe" about 3000 tons coal capacity Virginia to Freybentos at or about $21, net March, and the British steamer "Lady of Gaspe," about 700 tons coal capacity, from Virginia to Bermuda, at $6, March. We would quote freight rates on coal by steamer as follows:

	Mar. 12	Mar. 19
Europe		
West Coast Italy	$50.40@57.60	$50.40@57.60
Marseilles	50.40@55.20	50.00@55.20
Barcelona*[2]	22.80@27.60	22.80@27.60
South America		
Montevideo	24.00 about	24.00@25.20
Buenos Aires	24.00 about	24.00@25.20
Rosario	25.20@26.40	26.40 about
Rio Janeiro	[3]20.00 about	[3]20.00 about
Santos	[3]21.00 about	[3]21.00@22.00
Chile (good port)	15.00@16.00	15.00@16.00
West Indies		
Havana	4.75@5.00	5.00 about
Cardenas, Sagua	7.00 about	7.00 about
Cienfuegos	7.50 about	7.50 about
Port au Spain	10.00 about	10.00 about
St. Lucia	10.00 about	10.00 about
St. Thomas	8.00@9.00	8.00@9.00
Barbados	10.00 about	10.00 about
Kingston	7.50 about	7.25 about
Curacao[1]	8.50 about	8.00 about
Santiago	7.50 about	7.50 about
Guantanamo	7.50 about	7.00 about
Bermuda	7.00@8.00	7.00@8.00
Mexico		
Vera Cruz	8.50@9.00	8.50@9.00
Tampico	8.50@9.00	8.50@9.00

* Spanish dues for account of cargo. [1] And p.c.
[2] Or other good Spanish port. [3] Net.
W. W. Battie & Co.'s Coal Trade Freight Report.

COASTWISE FREIGHTS

Four dollars continues the nominal rate on boats of any size from Hampton Roads to Boston; $3.50 to $3.75 is quoted to Providence and New Bedford for similar loading. Inquiry is only scattering, and most of the demand is met by small barges.

Freights from New York to Boston are down to $1.75 from the $1.90 to $2 of a week ago, due to a less urgent demand for anthracite. To Sound ports freights are fairly steady at $1.15 to $1.25, depending on terms for dispatch.

Ohio Valley

PITTSBURGH

Spot market slightly easier, with better car supplies. Contract market stiff.

The threatened railroad strike did not have much effect last week on spot coal prices, for while some consumers became more anxious to secure coal at their works there was an indisposition on the part of many buyers to purchase on the closing days of the week because the coal might not be delivered until after the strike. This week opened with better car supplies all around and a market was developed at about 25c. less than obtained one week ago. As a rule best grades of gas and coking coal are available at $4.25, steam coal being 25@50c. less, according to grade.

On all hands car supplies and coal movement are expected to improve in the next few weeks, and a relatively easy market is expected. When the Lake shipping season comes the supplies of cars can hardly increase materially, and as the Lake coal must be moved the scarcity of prompt coal is then expected to be greater than at present and the market is expected to move upwards.

The contract market has become very narrow as there are so few sellers. The leading interest is reported to be out of the market entirely, so far at least as concerns the general trade. On the theory of a 60% car supply it would have little coal available for the contract market, in view of its large contract with the Steel Corporation and the contracts that were made a year ago for a two-year period, to run with the wage agreement with the men. Some of the independents are quoting $3.50 for the twelvemonth period, and this is the market as far as one can be quoted at all. There is nothing clear on the Lake market, but a number of arrangements have been made, the price to be fixed when a definite market is established.

We quote spot coal at $3.75 for slack, $3.75@4 for steam mine-run and $4.25@4.50 for ¾-in. gas, with contract at $3.50, all per net ton at mine, Pittsburgh district.

BUFFALO

Bituminous prices uncertain. All sorts of figures made by the mines. Threatened railroad strike stimulates buying, temporarily. Anthracite slowly recovering.

Bituminous—The local trade hardly knows what prices to make on anything, for the asking prices at the mines differ nearly $2. If the shipper has but a small amount of free coal he is firm and high-priced, but if he has cars and no contracts he is willing to sell low. The approaching end of the old contracts has some influence with mine owners; they do not quite know what is to be done with the output after Apr. 1.

As a rule the consumers are not buying liberally as there is a tendency to hold off till after Apr. 1, and see how the contract business lines up. At the same time the shippers are not urging contracts and are firm in their prices. The usual range of 50c. in quotations would once more answer if it could be determined just what the prices really are, but when jobbers differ in mine quotations all the way from $3.75 to $5.50, it is hard to fix an average figure. Jobbers are eager for some definite price, for they now find it necessary to sell their coal before they buy it.

The buyer and seller are still for the most part unable to agree on contract prices, both seeing a big risk and probable sacrifice if the other's figures are accepted. It is said that not 30 per cent. of the contracts of a year ago have been taken yet. Public consumers, who are usually in the market by this time, have sent out no request yet. Sellers will not generally accept $3 net and some are getting more.

Still the prices are slowly declining and the quotations are about as follows, all per net ton f.o.b. Buffalo:

Youghiogheny Gas	$5.75@6.25
Pittsburgh Steam	5.50@6.00
Ohio No. 8	5.50@6.00
Allegheny Valley	5.25@5.75
Cambria Co. Smithing	5.20@6.20
Pennsylvania Smokeless	5.65@6.15
All Slack	5.00@5.50
Cannel	5.90@6.10

Anthracite—The demand is still in excess of the supply and there is not much prospect of meeting the demand so long as the weather continues so cold. Consumers who thought they were out of the market till next winter's supply is laid in are buying several tons more and this makes a big difference with the outlook. At the same time the independent premium has about disappeared, and the standard companies appear to be prepared to meet the demand in the future.

There is much speculation as to the April price, the general idea being that there will be no reduction. It may easily happen that labor difficulties come up, as they have already done in the bituminous mines and in that case the anthracite supply will run down as it did last April.

There is much need of anthracite for the Lake trade and some of the shipping agencies are expecting a supply by Apr. 15, but there is no real assurance of it, with such a big territory to satisfy. So far the Canadian dealers who come here for coal are just as numerous as ever. Even Buffalo is still rather scantily supplied.

TORONTO

Situation shows improvement. Prices easier but bituminous scarce and likely to continue so. Recent receipts light.

Conditions have latterly shown considerable improvement, with a downward tendency in prices, though receipts for the past few days have been light. There is a sufficient supply of anthracite on hand for immediate requirements, but bituminous is still scarce with little prospect of a change for the better, owing to the heavy demand which will ensue on the opening of navigation. The outlook for the supply for industrial purposes is regarded as very serious.

Quotations for best grades per short ton are as follows: Retail anthracite egg, stove and nut, $9.50; grate, $9.25; pea, $8; bituminous steam, $12 to $15; slack, $12 to $15; domestic lump, $10; cannel, $10. Wholesale f.o.b. cars at destination three-quarter lump, $8; slack, $8.

DETROIT

Easier market for domestic coal is offset by steady buying of steam plants. Anthracite business light. Lake shippers look for tonnage.

Bituminous—With the terminal tracks in Detroit clear of the congestion of freight that interfered with shipments, the railroads are making more satisfactory delivery than for several months, but the increase is not so great that any coal is being left on tracks. Practically all arrivals are either sold before shipment or while in transit. Prices are maintained with a considerable firmness. For lump, egg and slack the quotation at the mines is around $4.75, and on lump and egg of the smokeless type, which appears difficult to get, the mine price is from $5.50 to $5.25. West Virginia or Ohio mine-run of good quality is quoted at about $4.50 at the mines.

Despite several days of rather low temperature and blustery winds, the demand for domestic sizes has eased off and there is now little pressure on the retail dealers, whose customers are asking for very small amounts. The retail dealers do not care to stock up with coal which may have to be carried through the summer at present prices. As the steam plants are gladly taking domestic sizes, the jobbers are not worrying over the falling off in retail yard trade.

Anthracite—Inquiry for anthracite from household consumers is less urgent and orders are mostly for one-half ton or less. Retailers are not buying very liberally and show a disposition to await a possible discount on Apr. 1. Protracted delays in delivery due to congestion in the East tends to discourage buying.

Lake Trade—With the opening of navigation now probably less than a month distant, Lake shippers seem to be making slow progress in closing contracts for vessel capacity. Supplies in the district served by Lake Michigan ports are so low that shipments are being made by rail.

CLEVELAND

Car supply improved and market easier. Contracts being closed for yearly requirements. New car service rules meeting with objections.

Most of the Ohio mines have had a better car supply the past few days and this fact, together with the mild weather prevailing, has forced prices down to some extent, but not as much as would be expected.

While the market has been quiet, the consumer has been busy making arrangements for his future requirements and several contracts have been closed on Pittsburgh No. 8 coal for the period of one year from Apr. 1. One contract calls for 100,000 tons mine-run at $2.50 net ton, f.o.b. cars the mine; one for 125,000 tons slack at $2.50, and one for 150,000 tons mine-run at $2.50. Also, a contract for 100,000 tons three-quarter to be shipped during the coming season of Lake navigation at a price of $2.75 net ton, f.o.b. mine.

The fishing season opened on Mar. 15, and a temporary price of $6 per ton has been made for fishing tug bunker coal, to prevail for the next few weeks or until the regular opening of navigation. This price represents little or no profit to the dealers who supply the tugs, as most of them have no coal on hand and have been obliged to buy enough in the open market to take care of their customers until they are able to get supplies from the mines.

The new car service rules adopted by the Ohio coal roads, effective Apr. 15, cutting down the free time under the average plan on coal for Lake shipment, from five to four days, are not meeting the approval of Lake coal shippers and they are talking of making an appeal to the Interstate Commerce Commission. Shippers claim that under the new rules and present car supply it will be almost impossible for a great many of them to accumulate a medium-sized cargo within the free time, let alone a cargo of ten or twelve thousand tons.

Following are the market prices per short ton, f.o.b. Cleveland:

	Three-quarter	Mine-run	Slack
No. 8	$4.50	$4.50	$4.50
Cambridge	4.50	4.50	4.50
Middle Dist.	4.50	4.50	4.50
Hocking	4.00	4.00	4.00
Pocahontas	....	5.50	....

COLUMBUS

Trade in rather unsettled condition. Prices steady and receipts sufficient for current needs and some stocking.

Domestic trade has been a little slow as retailers are about over their winter rush. A few cold snaps which usually occur during March and early April are expected to instill strength in the trade. Likewise an early stocking of domestic sizes is expected and preparations are being made for a lively business during May and June. Retail stocks are not very large, although they are now sufficient for the present. Some of the dealers have accumulated stocks to guard against a shortage during the strike. Retail prices are still firm at the levels which have prevailed for some time. Pocahontas is in good demand and prices are firm.

In steam circles considerable activity has developed. Iron and steel plants are still busy and the same is true of other lines of manufacturing. The car situation has been improved and there is now no actual shortage of coal in any section. All grades of steam fuel are holding firm at the reduced levels.

Production during the past week has been rather brisk because of better car supply and transportation facilities. In the Hocking Valley the output is estimated at 85 per cent. of normal. Eastern Ohio is still hampered by a short car supply and the output has been about 50 to 60 per cent. Massillon, Cambridge and Crooksville have produced about 65 per cent. of normal and the figures from Pomeroy Bend also show a slight increase.

Active preparations are being made for the early opening of the Lake trade. Operators and railroads have announced Apr. 16 as the opening date for navigation, but that does not mean that traffic will be opened to the head of the Lakes. As in former years insurance will not be available until May 15. But owing to a scarcity of fuel in the Northwest, an early start is desired and boats will be loaded during the latter part of April to be started to the upper Lake ports as soon as the ice is off. The fuel situation in the Northwest is the worst in the history of the Lake trade in years.

Prices on short tons f.o.b. mines are as follows:

	Hocking	Pomeroy	Eastern Ohio
Rescreened lump	$3.75	$4.00	....
Inch and a quarter	3.75	4.00	$3.75
Three-quarter inch	3.50	3.75	3.50
Nut	3.50	3.50	3.50
Egg	3.25	3.50	....
Mine run	3.25	3.50	3.25
Nut, pea and slack	3.00	3.00	3.00
Coarse slack	3.00	3.00	3.00

CINCINNATI

Milder weather has reduced domestic demand, but steam coal is still scarce and high. Transportation situation continues bad.

Warmer weather has prevailed during the past week, tending to reduce the demand for domestic coal, as consumers are in most cases endeavoring to finish the season without further buying. There is no diminution in the urgent call for steam grades, however, and as the same difficulties continue which have hampered operations for several months, there is no lessening in the remarkable strength of the market. The car supply is extremely poor. Prices are maintained at high levels on all grades from all districts, and contracting is on a corresponding basis.

LOUISVILLE

Embargoes and traffic restrictions aggravate difficulties and disturb market. Car supply improved and demand strong.

There are no steady prices and it is impossible to promise shipments or take orders for other than immediate filling. Domestic consumers are in the market, those who bought last summer finding their supplies exhausted by the severe winter. The industrial demand has been rather insistent in the expectation of belated deliveries later.

Eastern Kentucky prices, f.o.b. the mines are quoted: Block, $3.75@4; mine-run, $3.75; nut and slack, $3.75. Western Kentucky prices, last quoted, ranged: Lump, $2.50; mine-run, $2; nut and slack, $2@2.25.

BIRMINGHAM

The market is easier and price schedules unchanged. Cars scarcer as a result of attempted stocking by railroads and furnace operations.

Aside from a slight spasmodic buying movement during the last few days of last week in anticipation of a strike of railroad employees, during which time mine-run steam coal sold in car lots from $4.50 to $5.50 per ton mines, a few cars selling as high as $6.25, the market was easier than the previous week and schedules remained unchanged. Several railroads are actively negotiating to cover their requirements for another year and will likely close during the week. The Louisville & Nashville R.R. contracted for its requirements for the contract year with the mines served by its lines, at figures ranging, it is understood from $1.55 for lower unprepared grades up to $2 per ton mines for washed mine-run coal from the Cahaba field. The old contract called for $1.37½ per ton, regardless of grade.

Domestic prices range from $3 to $4.25 mines for lump, with little demand. Retailers are awaiting the spring schedules on the domestic grades, which is due Apr. 1 but on account of abnormal trade conditions it will probably be delayed beyond that date.

Coke

CONNELLSVILLE

Car supplies greatly improved. Narrow spot market and little negotiating on contracts.

Car supplies in the Connellsville region this week are the best for many weeks, a few operations having received their full quotas on Monday, with good supplies indicated for the balance of the week, as the Monday's supply followed a very blustery Sunday, with snow flurries, making conditions far from favorable for placing cars. The spot furnace coke market on Saturday was very irregular, with one sale at least as low as $8.25, the lowness of the price being due no doubt to consumers being unwilling to buy when a railroad strike was threatened and the coke might not be delivered for a long time. This week a steadier market developed, but hardly an active market.

There is not much negotiation on foundry coke for the second half of the year, and none at all on furnace coke, there being no inquiry in the market for the latter. In foundry coke the most anxious consumers were probably satisfied in the recent movement, when some sellers did $6.50 and $7 and then withdrew. We quote the market now as follows: Spot furnace, $9@9.50; contract, nominal, $7@8; spot foundry, $11@12; contract, nominal, $7.50@8.50, per net ton at ovens.

The "Courier" reports production in the Connellsville and lower Connellsville region in the week ended Mar. 10, at 349,204 tons, an increase of 2741 tons, and shipments at 350,170 tons, an increase of 7440 tons.

Buffalo—The demand is still as much in excess of the supply as ever. There is some prospect of more cars soon, but till they are here the prices will remain where they are. No consumer has any supply ahead and the prospect of a surplus is as remote as ever. That the consumer is not paying more than he is seems to be on the ground that the ovens do not think it best to ask more. Prices are on the basis of $11 at the ovens, or $12.85 f.o.b. Buffalo, for any good grade.

Chicago—The coke situation is still very strong, and the question of obtaining adequate supplies of coal for the ovens is a serious one. Production is moving almost entirely to contract customers, and inasmuch as no spot coal is in transit prices are not being quoted.

Birmingham—The demand for coke is as strong as ever and quotations for spot foundry are firm at $12.50 per net ton ovens. All indications point to a continuation of high price levels for some time—in fact until facilities are provided for increasing the production to more nearly meet the legitimate demands on the district brought about by industrial activities. Free furnace coke is almost an unknown quantity, such as is offered being quoted at $7.50 per ton ovens. Producers are experiencing considerable difficulty in moving the product from the ovens on account of scarcity of equipment, which condition has been accentuated by the anticipated railroad strike. Foreign customers are suffering for coke, as the movement of this business to the West and Southwest is entirely dependent upon foreign line equipment, which is very hard to obtain.

Middle Western

GENERAL REVIEW

Car supply improved at mines. Increased buying of coal for storage and shipment to the Northwest from Indiana and Illinois mines. Smokeless coals easier.

The spot market at Western centers softened somewhat towards the latter end of last week. At the beginning of the week empty cars became more abundant than at the mines for several days which had a tendency to cause a break in steam prices especially in the central Illinois field. Retailers and industrial plants have been competing for free coal during the week, but have not made much headway in accumulating stocks. Terminal congestion has been almost entirely relieved, so that deliveries have shown material improvement.

The Northwest is now dependent upon Western mines for its supplies, the upper Lake docks being practically bare of commercial coal, and this has created a tremendous demand, particularly at southern Illinois mines. The future of the dock trade appears very dark as regards supplies; Eastern coal is being absorbed at home; none is being accumulated for forwarding up the Lakes as is customary at this time. From present indications it will be the first of June before any considerable tonnage of Lake coal reaches Duluth or Superior. It is reported in one instance that opening prices for bituminous lump for delivery at the upper Lake docks has been on a basis of $6 f.o.b. the docks, and it looks as though this may be the standard price during the season. Some think now that the vessel rate will reach 75c. before the season is very far advanced.

In contracting some railroad buyers have made a determined effort to break the market, but their surplus stocks are low and they are showing more of a tendency to close up negotiations. A spirit of caution is still displayed in the matter of making new contracts. Some industrial consumers think that prices will drop later in the spring, but producers take a contrary view. The demand from railroads for storage and current consumption will be very heavy while they will be in little better position to move tonnage than they were several months ago.

Some of the public utility corporations are much concerned as to the high prices quoted to them; their service rates in many cases have been based upon a lower average figure, and there is no way to raise them to take care of the increased cost of coal. Some of the carriers are laying special emphasis on the fact that they must have higher freight rates in order to meet the increased cost of fuel.

CHICAGO

Supplies of Eastern coals very limited. Terminal congestion improved. Contracting delayed.

In the early part of the week there was more of a disposition on the part of Illinois and Indiana operators to meet the demands of buyers in the way of prices and deliveries, particularly since the car supply at the mines had improved and terminal congestion was relieved.

Franklin County has been doing particularly well on domestic sizes because of the tremendous demand from the Northwest, as well as from northern Indiana and Michigan points. Demands from the Saline County field, under railroad contracts, have been exceedingly heavy, and no free coal has been available. Williamson County has not lagged far behind Franklin County in the amount of shipments made at high figures. Arrivals of southern Illinois coals in the Chicago market have been greatly lessened during the past week.

In the central Illinois field steam sizes broke sharply towards the end of last week. Big buyers have hammered steam sizes from the Springfield district to such an extent that in the early part of this week screenings had fallen to $1.25. Car supply in the central Illinois field has greatly improved, and this coupled with the fact that the demand fell off during the early part of the week, caused a decided slump. The demand from the Northwest is so heavy that the southern Illinois mines cannot meet it and the Springfield district is commencing to increase its shipments to the Northwest very materially.

No free coal is obtainable in Chicago from the Knox County field. The demand for Indiana production at home is so pressing that very little coal from there has been offered in Chicago during the past week. The mines have been operating about 50% of normal capacity during the week.

Smokeless arrivals have been more plentiful. Pennsylvania shipments continue to be confined to box car mine-run sold around $4.

Very little Hocking and splint coal is selling in the Chicago market owing to no arrivals. Kentucky car supply has been much easier, and a wide variation of prices prevails here.

Anthracite orders for future delivery have been accumulating, but the dealers seem to be unable to promise any definite shipments. April discount figures have not been quoted, and independents are known to be receiving from $1 to $1.50 premium on shipments to be delivered in April. Transportation conditions on all-rail anthracite are still so congested that no assurances can be made as to delivery. Anthracite is almost entirely out of the market, and briquettes, byproduct coke and some Western bituminous sizes are used as substitutes by domestic consumers.

Quotations in the Chicago market are as follows, per net ton f.o.b. cars at mines:

	Springfield	Fulton & Peoria Cos.	Clinton & Sullivan Cos.	Green & Knox Cos.	Carterville
Domestic lump	$3.00@3.25	$3.00@3.50	$3.25@3.75	$3.25@3.50	$3.25@3.75
Steam lump	2.75@3.25	3.00@3.25	3.00@3.50		
Egg	3.00@3.25	2.75@3.25	3.00@3.50	3.25@3.50	3.25@3.75
Nut	3.00@3.25	2.50@3.00	3.00@3.50		
Mine-run	2.00@2.25	2.00@2.50	2.75@3.00		
Screenings	2.00@2.25	2.00@2.50	2.50@3.00	2.25@2.75	

	Williamson & Franklin Cos.	Saline & Harrisburg	Poca. & W. Va. Smokeless	Penna. Smokeless	Eastern Kentucky
Lump	$3.75@4.00	$3.75@4.00	$5.00@5.25		$3.25@4.25
Egg	3.75@4.00	3.75@4.00	4.75@5.00		3.00@4.00
Nut		3.50@3.75			
No. 1 nut	3.75@4.00				
No. 2 nut	3.75@4.00				
No. 3 nut	3.50@3.75				
No. 1 washed	3.75@4.00				
No. 2 washed	3.75@4.00				
Mine-run	3.00@3.25	2.75@3.25	4.50@4.75	4.00@4.25	
Screenings	2.75@3.25	2.75@3.25			

Hocking Lump $4.25@4.50. Splint Lump $4.00@4.25.

ST. LOUIS

Domestic demand easier. Car supply better than usual on account of embargoes. Contracting slow with most prices withdrawn. Indications are higher prices will be asked. No anthracite or smokeless received, and the future uncertain.

Screenings are in most demand and these chiefly from the Standard field. High grade coal is practically begging on the market. Standard the early part of the week on 2-in. lump declined to about $1.35 at the mine, with screenings about the same, while 6-in. fell off to $1.50. At the close of last week on guaranteed deliveries to the Terminal, Standard 2-in. lump sold at $2, screenings at about $1.75 to $1.85 and 6-in. from $2 to $2.25.

On Williamson and Franklin County coal the Iron Mountain restricted all its equipment so that shipments could not be made to Chicago or to any points outside of St. Louis excepting on Missouri Pacific and Iron Mt. lines. This forced a large tonnage of high-grade coal in here, and lump declined to $2.25, with screenings about the same. On outside shipments prices ranged anywhere from $2.75 to as high as $3, while coal for the north brought as much as $3.25.

In the Mt. Olive field the bulk of that product continues to move north and east and very little is offered here.

There have been no receipts of anthracite recently and practically no smokeless.

The strike of all the brick-yard employees in the city has reduced the local consumption of Standard coal by perhaps 1000 to 1500 tons a day.

The C. & E. I. R.R. has issued a new tariff cancelling all rates to points West and Southwest through the St. Louis gateway as well as to St. Louis proper and has increased its rates to all local points in Illinois.

Car supply has improved some on all roads. In the Standard field this was caused chiefly by the large number of cars furnished by foreign roads for company fuel. The local situation has eased up considerably, though the terminals are still much congested and last week closed with an unusually heavy tonnage accumulated on account of perishable matter and fuel being given the preference.

There has been little doing in the way of contracting the past week in either field. There was too much uncertainty as to the future, and most operators withdrew all contract prices that had been quoted. In the Williamson County field a contract is reported for 2000 tons a week of Carterville mine-run for one year at $1.37½ per ton mines. This is about 62½c. per ton below what is being generally asked from large steam consumers on contract. At this writing it is evident that the $2 price on mine-run and screenings from the high-grade field has practically ceased and higher prices will be asked.

The prevailing market per net ton f.o.b. St. Louis is about 25c. to 50c. lower than country shipments and is:

	Williamson and Franklin Co.	Mt. Olive and Staunton	Standard
6-in. lump	$2.50@2.75	$2.25@2.50	$2.00@2.25
3x6-in. egg	2.50@2.75	2.25@2.50	2.00@2.25
2x3-in. nut	2.50@2.75	2.25@2.50	2.00@2.25
No. 2 nut	2.50@2.75		
No. 3 nut	2.50@2.75		
No. 4 nut	2.50@2.75		
No. 5 nut	2.25		
2-in. screen	2.25@2.50	2.00	1.50@1.75
2-in. lump			1.75@2.00
3-in. lump		2.00	
Steam egg		2.00	1.75@2.00
Mine run	2.25@2.50	2.00	1.50@1.75
Washed			
No. 1	2.50@3.00	2.25@2.50	
No. 2	2.50@3.00	2.25	
No. 3	2.50@3.00		
No. 4	2.50		
No. 5	2.25		

Rate on Williamson & Franklin Co. is 72½c
Rate on other fields is 57½c.

General Statistics

COAL SHIPMENTS

The following statement of carloads of bituminous coal that originated on 58 railroads and of beehive coke on 14 roads in February, 1917, is compiled from reports received by the Geological Survey, Department of the Interior, by noon, March 15, 1917.

	1917 February	1917 January	1916 February
Number of working days	23	26	24
Carloads of bituminous coal, Pennsylvania (13 roads)	148,290	179,974	183,695
W. Va., Va., Md., and Ohio (10 roads)	164,062	199,610	185,501
Ill. and Ind. (16 roads)	144,522	164,179	148,271
Ky. and Ala. (6 roads)	38,785	42,698	33,387
Iowa, Tex., Colo., and Utah, and Southwestern States (13 roads)	45,557	53,655	46,080
58 roads	541,216	640,116	597,434
Carloads of beehive coke (14 roads)	58,450	72,110	73,124

The decrease in shipments of bituminous coal in February, 1917, compared with January, 1917, was 15.5%, and compared with February, 1916, was 9.4%. The average number of cars of coal per working day was 23,531 in February, 1917, against 24,620 in January, 1917, and 24,893 in February, 1916. The shipments in February were less than in January, which was to be expected because of the fewer working days. These statistics indicate that, except in Kentucky and Alabama, the daily rate of production was lower in February than in January, 1917, and considerably less than in February, 1916. The average daily loading on 23 roads in Pennsylvania, West Virginia, Virginia, Maryland and Ohio was 7% less in February than in January, 1917, and on 13 roads west of the Mississippi was 19% less.